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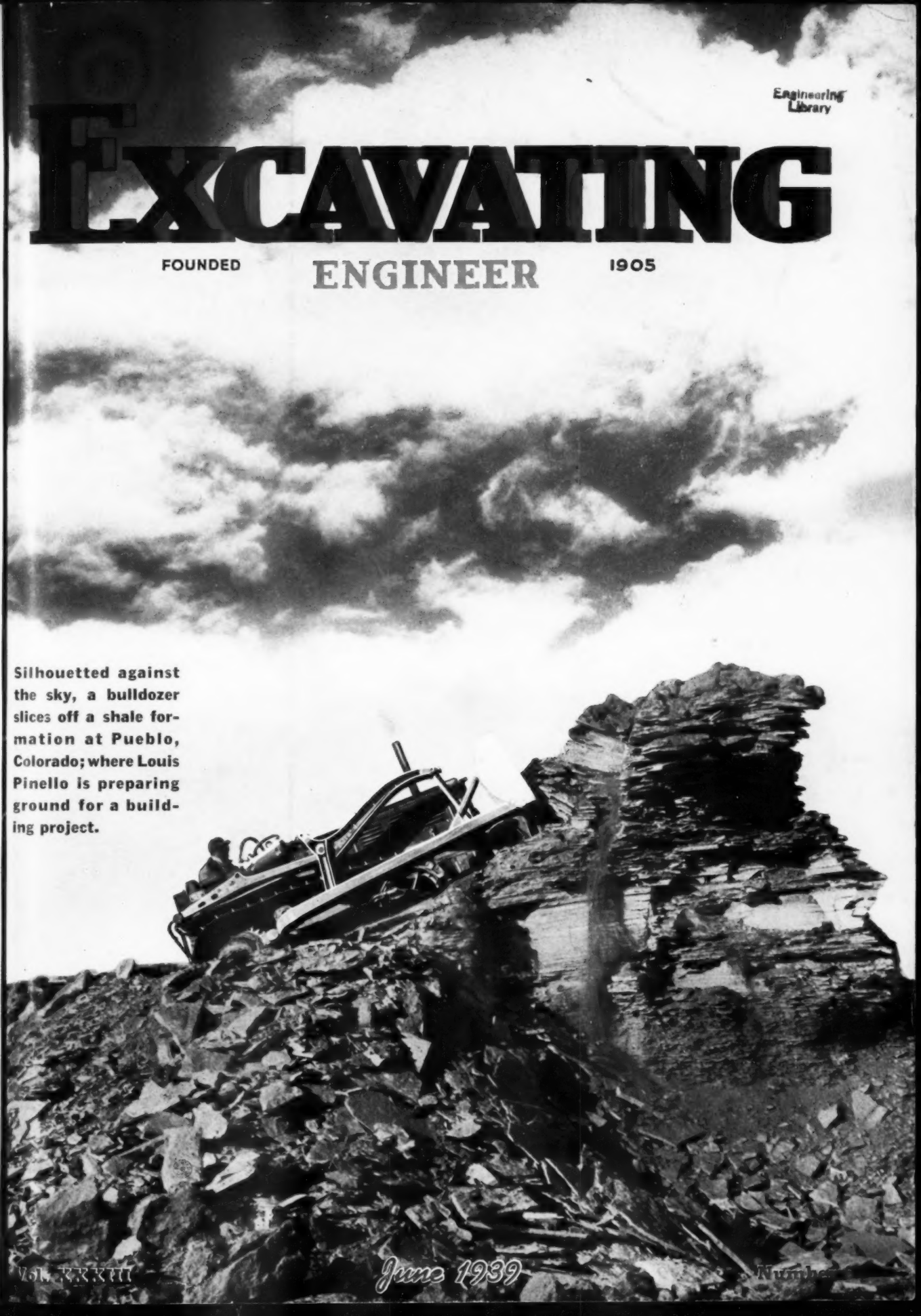
EXCAVATING ENGINEER

FOUNDED 1905



Silhouetted against the sky, a bulldozer slices off a shale formation at Pueblo, Colorado; where Louis Pinello is preparing ground for a building project.

VOL. XXXIII June 1939 Number

NEW

the modern 2 - yard leader shovel - dragline - crane

The Bucyrus-Erie 44-B offers you performance that means new highs in profit on your excavating. From dipper teeth to cats, it's MODERN. All the skill of the biggest, most experienced engineering staff in the industry; all the resources of the largest excavating machinery manufacturer in the world, have been concentrated on giving you the best possible earning tool. If you're interested in a 2-yard shovel-dragline-crane, write for the new 44-B Bulletin and find out why it's far and away the top machine in its class.

BUCYRUS ERIE

Bucyrus-Erie

SOUTH MILWAUKEE, WISCONSIN

EXCAVATING ENGINEER

FOUNDED 1905

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JOHN I. MORAVEC *Art Director* — DELMAR COHEN *Assistant Editor*
E. M. HEUSTON *Advertising Manager* — H. J. MASUHR, JR. *Assistant Editor*

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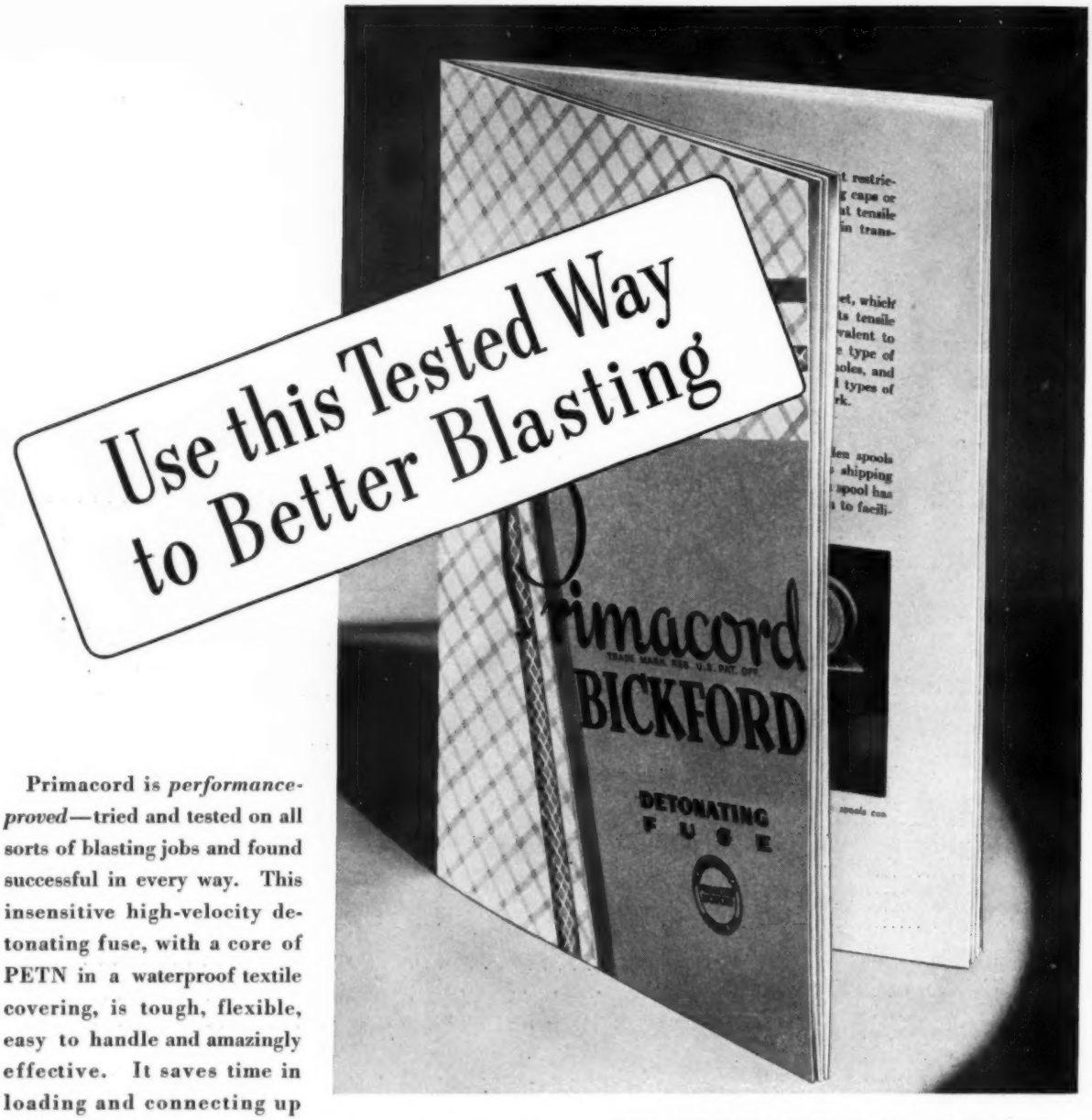

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PB9

For your convenience in writing to The Ensign-Bickford Company, you will find a card bound in this issue.

Dirt Pays Dividends through the INTERNATIONAL TD-40 DIESEL

TD-40 with bulldozer on the front and scraper behind—a highly efficient dual up for digging dirt and dumping it into the fill, leveling the fill, keeping the ng road in shape, backsloping, building shoulders, cutting ditches, etc.

Dirt *must* pay dividends to the man who moves it on a big scale. Much of the brilliant reputation International TracTracTors enjoy in this field is due to the performance and low-cost operation of the TD-40 Diesel. On every kind of job, under the toughest conditions, the TD-40 has proved its leadership in its class. **The TD-40 develops 49.55 max. h.p. (drawbar) in third (rated) gear, 50.23 max. h.p. in first gear, under standard sea level operating conditions.**

In the TD-40, the economical International 4-cylinder *full* Diesel engine combines with International crawler design and quality construction—a combination that cuts operating costs to the bone, keeps maintenance costs down, and provides long tractor life. Like all TracTors it converts an exceptionally large percentage of its engine power into useful work at drawbar, belt pulley, and power take-off.

For complete information, see the International industrial power dealer or Company-owned branch near you. Also ask about the *new* International TD-18 TracTracTor—a *full* Diesel delivering 70 h.p. at the drawbar.

INTERNATIONAL HARVESTER COMPANY
(INCORPORATED)
180 North Michigan Avenue Chicago, Illinois

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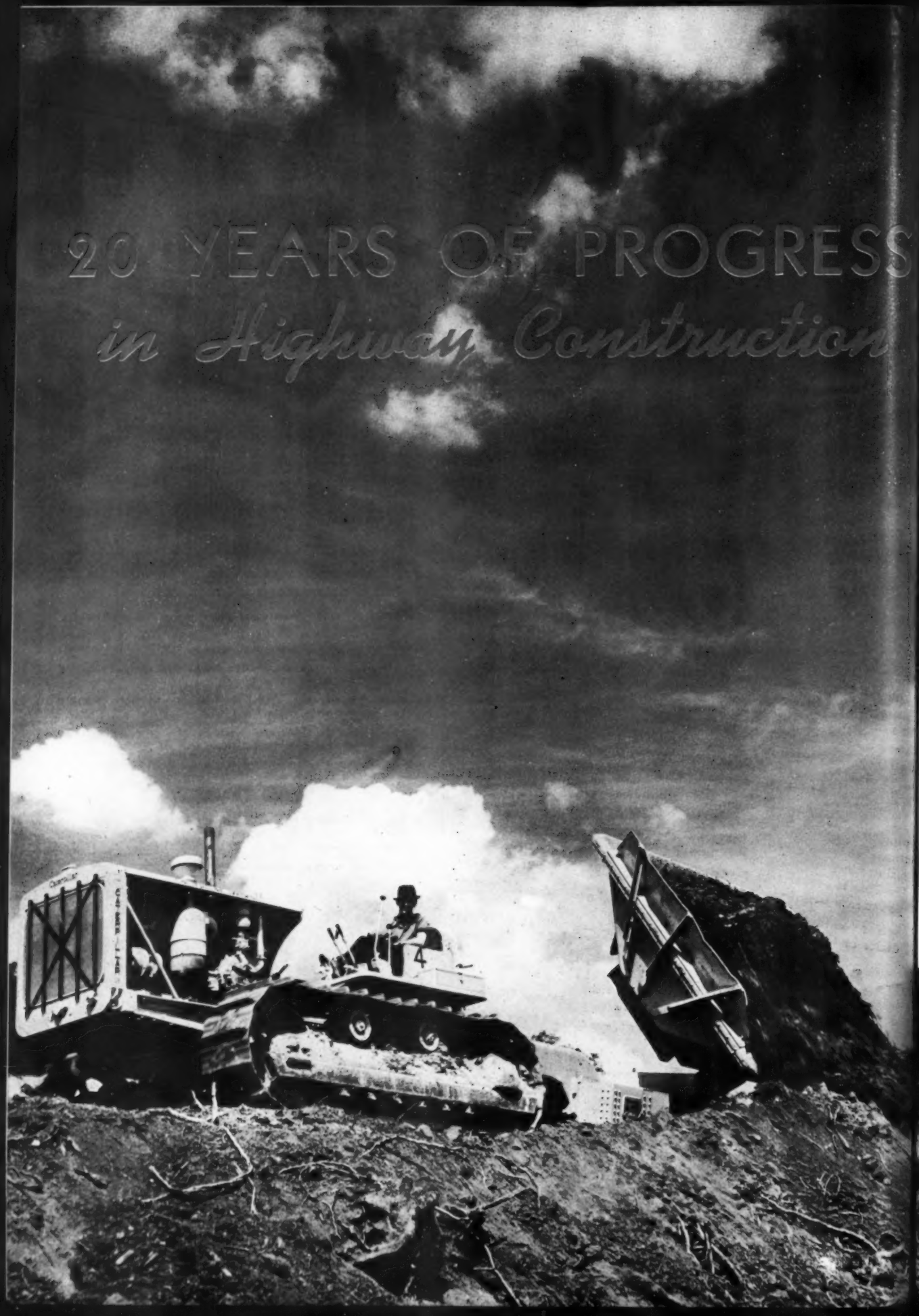
1. Six TracTracTors (gasoline and Diesel), up to 70 h.p. (drawbar).
2. Five wheel-type tractors (gasoline and Diesel). The Model ID-40 is the only Diesel-powered industrial wheel tractor on the market.
3. Eleven models of power units (gasoline, Diesel, and gas) ranging up to 110 max. h. p.
4. Modified units available to equipment manufacturers to power a wide variety of allied equipment.
5. International Trucks in 42 models and 142 wheelbases, range from ½-ton units to powerful Six-Wheelers.
6. International Harvester's reputation for quality construction.
7. International design means low-cost maintenance. Accessibility of all parts means more productive hours on the job.
8. International after-sale service available through dealers and Company-owned branches. No matter where your jobs are, International service is close by.

Right: Down Rio way they are laying an additional aqueduct for the water supply system of this famous Brazilian city. The TD-40 is clearing the right-of-way through woods and also handling from 260 to 390 cubic yards of dirt a day.

Left: A fast, flexible outfit for handling dirt on short or medium hauls—the TD-40 and 2-wheel, 4-cubic-yard (heaped) scraper.

INTERNATIONAL INDUSTRIAL POWER


20 YEARS OF PROGRESS
in Highway Construction

Twenty years have shown a remarkable advancement in the development of tools and equipment used in highway construction earth moving operations.

By F. A. Nikirk
Caterpillar Tractor Co.

Editor's Note: This article is based on a paper presented by Mr. Nikirk before the Asphalt Institute in Los Angeles. The old equipment pictures were furnished through the courtesy of The Austin-Western Road Machinery Co., Bucyrus-Erie Co., Caterpillar Tractor Co., and Koehring Company.

HIGHWAY construction today requires the moving of six times as much earth per mile as did road building prior to 1919. The length of haul in earth moving has increased. Entirely new methods and processes of placing and compacting fills have been developed to prevent settlement and to improve supporting power for the foundation of pavements. Flatter slopes on the sides of both cuts and fills are now demanded to prevent erosion and to reduce maintenance cost.

In this progressive development with changing conditions, construction equipment has had to change with the times. It has had to increase in capacity and dependability and to keep pace with the functional demands made upon it. How well this situation has been met is indicated by the trends in the cost of excavation.

Cost of Excavation Declining

The U. S. Bureau of Public Roads has compiled statistics on the cost of excavation on federal aid projects from 1922 to date. These show a declining trend until the average unit price bid in 1938 was 45.7% of that bid in 1923. Contrary to this, the trend of wages paid for common labor on construction work was 47.4% higher in 1938 than the average for the years 1919 to 1923 inclusive.

This is quite remarkable in view of the increase in the length of haul and the improved methods and processes that are required in placing and compacting fills and in preparing subgrades. Credit for this record must be given to the improvements in the equipment used and the more scientific methods of handling the work. The manufacturer of equipment does not deserve all of the credit for the reduction in grading cost for without proper management no equipment could function efficiently.

Science Aids Equipment Improvement

Discoveries of science have made some of the improvements in equipment possible. The metallurgist and laboratory technologist have played a far more important part than is generally known. Only through the development of materials and manufacturing processes have the designing engineer and the manufacturer been able to keep pace with the increasing demands and to provide larger capacities, greater ease and speed of operation, greater dependability and lower cost of operation.

In following trends, we are not interested in the inception of an idea or the invention of a machine, but we are interested in its acceptance and general use in highway construction. Since such acceptance is gradual, a fixed date can not be given. Let us then divide the past twenty years into four equal periods of five years each and place the acceptance and use of various machines in one of the periods.

Period of Hand Labor and Animal Power

The first period may be classified along with previous years as the era of manual labor and animal power. The contractor of that day drew on the experience of railway builders and adopted such methods and equipment from that field as were adaptable to highway work. Railroad type steam shovels had long been in use in other fields but they were heavy,

• The earliest method of road construction—hand power. Equipment consisted of horse-drawn dump-wagons, and men equipped with shovels and strong backs.

• Above: A wheel-mounted ¾-yard Erie steam shovel loading to a horse-drawn dump wagon averaged about 300 yards a day on this early road building job. Right: A modern ⅜-yard, gasoline-powered, cat-mounted Bucyrus-Erie handles about 80 yards an hour, bank measure, for the DeRuyter Brothers at Wilmar, Minnesota.

cumbersome and difficult to move from place to place. In the main, these shovels were of larger size than required for the light work on highway construction and too large for economical use with the small hauling units that were then available.

The beginning of this period also marks the introduction of several features in shovels and draglines that later led to their more widespread use. Among these were the full revolving feature, the mounting on crawler tracks and the introduction of the internal combustion engine. While the importance of these features was quickly recognized, their general acceptance in highway grading was delayed until a later period for several reasons. As previously stated, the amount of excavation per mile of road built was small. For this reason the use of power shovels was generally limited to rock excavation. In many cases, engineers would sacrifice alignment and grade to avoid heavy rock cuts. These factors, combined with the limited capacity of the hauling equipment then available, acted to reduce the amount of power shovel work in highway construction. Thus we can say that the general acceptance of the power shovel and its development for highway use came after 1923, when internal combustion engines replaced steam and lighter weight units with greater efficiencies became available.

Hammer Drills Introduced

Hand held and self-rotated hammer drills were introduced into the mining industry more than five years before the period in highway construction under discussion. Their adoption on road work was retarded on account of the problem of air supply. The so-called "portable compressors" of 1919 were ponderous, heavy and not easily moved in advance of the work. For this reason, hand drilling methods were most common on highway work except on the heaviest of rock cuts.

The 1½-yard team-drawn bottom dump wagon was in almost universal use for handling excavated material from 1919 to 1923. Occasionally, in the heaviest cuts, industrial railways were used and sometimes steam traction engines or tractors were seen moving trains of wagons or cars. Trucks were also used to some extent but the early models were not very satisfactory. They were generally of a heavy type of 4 or 5 ton rated capacity and mounted on solid rubber tires. They were difficult to handle and in many cases unable to turn within the limits of ordinary highway work. They could not operate satisfactorily over soft or uneven ground and their method of dumping was unsatisfactory. In spite of these handicaps it was considered that trucks would compete with wag-

• Left: Moving dirt with this mule-powered, two-wheel scraper was a slow and expensive operation. Below: A modern, large dirt moving unit is this LeTourneau scraper. The picture illustrates the trend toward using pusher tractors in loading larger scrapers.

• Left: It took quite a crew of men to operate this Austin-Western elevating grader in 1919. The unit was horse drawn with a pusher arrangement. Note the derbies on the workmen. Above: The Austin-Western of today. A 3-wheel unit with hydraulic controls drawn by an Allis-Chalmers tractor.

ons on hauls in excess of 1500 feet when surface conditions permitted. Since there was relatively little earth moved in excess of this distance, trucks did not replace many horse-drawn wagons. Their general acceptance will therefore be placed in a later period.

World War Popularized Tractors

During the World War track-type tractors demonstrated their stamina and their ability to operate over rough terrain. When the boys returned and engaged in construction enterprises, they tried to adapt tractors to grading operations. Tractor power had been used in road maintenance and for crowning roads with blade graders, but was not in general use in earth moving during this period. The reason for this was that equipment designed for tractor power was not available. Tractors were mainly used to replace horses or mules pulling equipment designed to be operated by animal power. Since horses and mules were used on the majority of the work, the adoption of a tractor for special work was rather rare.

Blade graders of this first period were rather crudely built. They were operated by hand controls through rough open gears that were subject to considerable wear. There were few, if any, anti-friction bearings. Lack of proper provision for take-up to overcome wear at joints made them difficult to control and the strength required to operate the controls earned for them the name of "man killers."

Grader Strength Increased

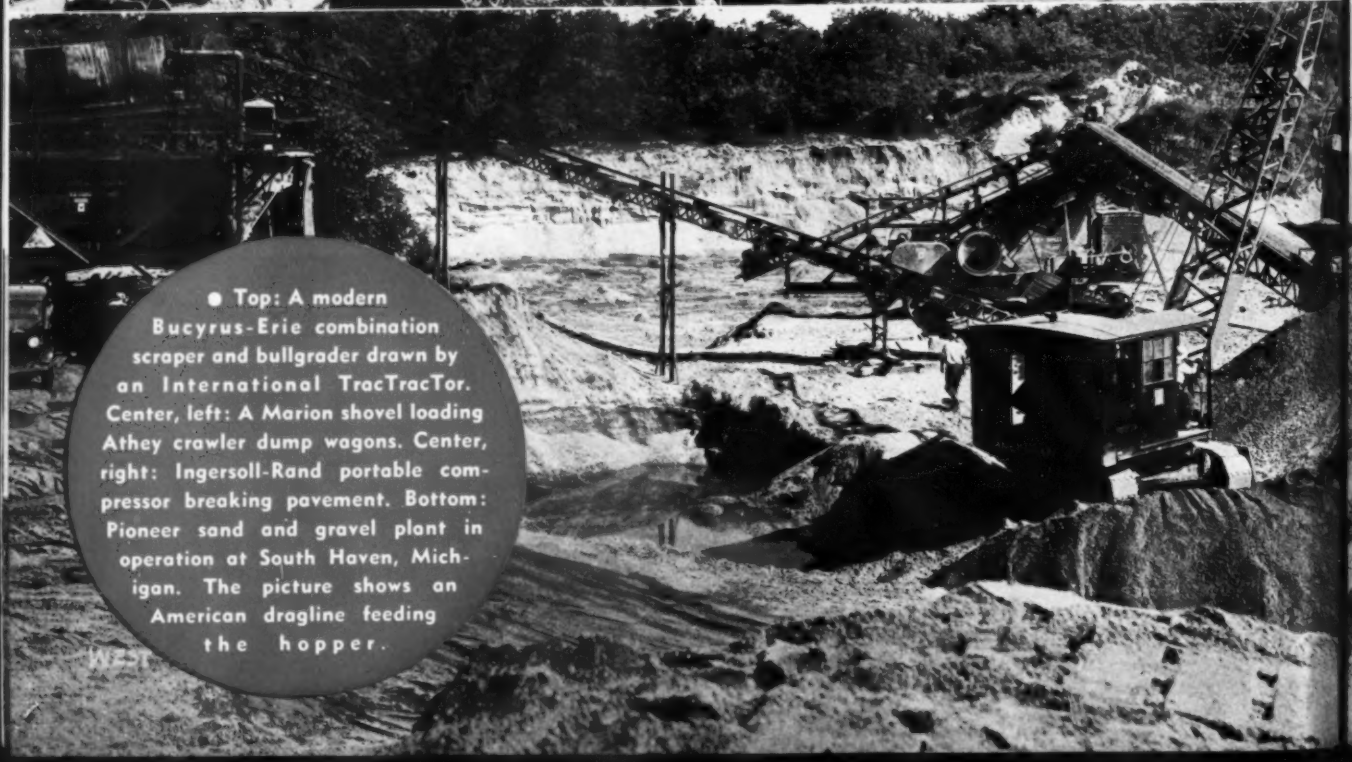
The introduction of tractor power brought about the steerable tractor pole and demanded that greater strength be built into the grader than was required when these machines were pulled by animal power. This was closely followed by the introduction of the back-sloper attachment for forming ditches at the side of the road. The steerable tractor pole permitted the operation of the blade grader over the side of a bank and in ditch work, and increased its field of usefulness. Thus the increase in size, capacity and functions made the blade grader an important piece of contractors equipment by the end of the first period of our twenty year review.

The elevating grader had been used on railroad construction for a considerable time prior to the period under consideration. It was adopted without change for highway work. It had proved its efficiency in either side-casting or loading earth into wagons or other hauling units, though it was limited in use to soil that could be plowed and turned upon the belt. The machine was pulled by horses or mules, with eight in front and four in the rear and the belt was operated from power derived from the bull wheel.

An elevating grader of this

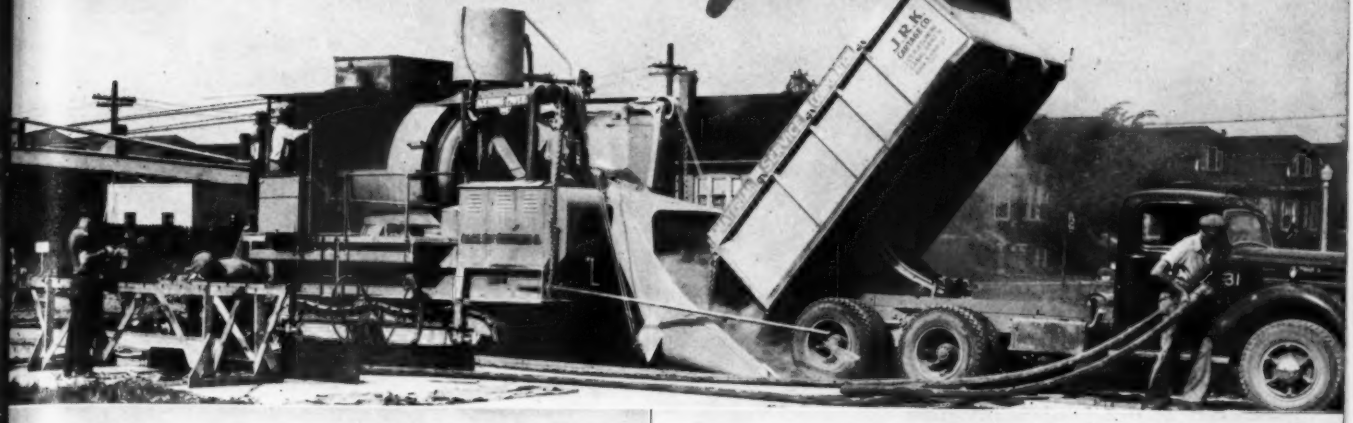
• Below: This Fresno was one of the earliest horse-drawn scrapers. Right: Today's county roadbuilding problems have developed "handy-man" dual units like this one shown working in Washington County, Ohio.

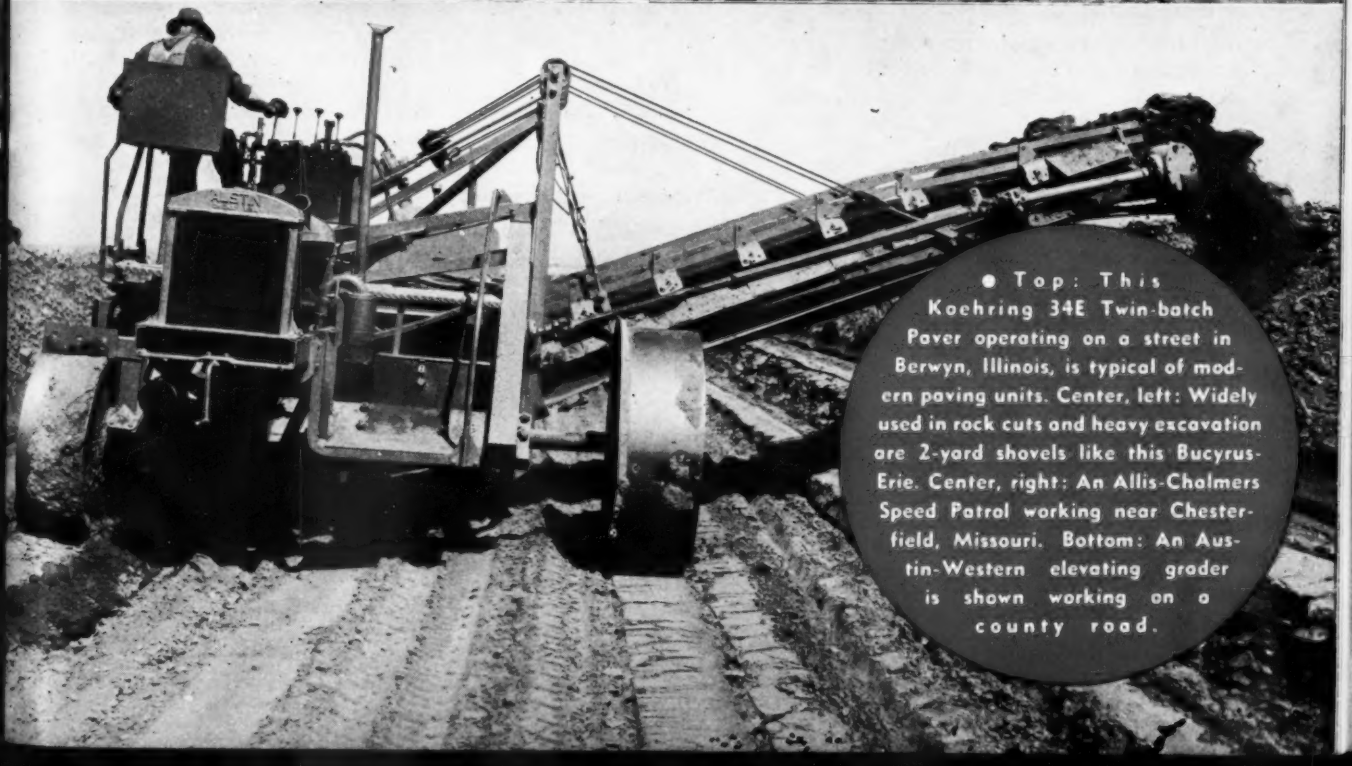
Modern Equipment



● Top: A modern Bucyrus-Erie combination scraper and bullgrader drawn by an International TracTracTor. Center, left: A Marion shovel loading Athey crawler dump wagons. Center, right: Ingersoll-Rand portable compressor breaking pavement. Bottom: Pioneer sand and gravel plant in operation at South Haven, Michigan. The picture shows an American dragline feeding the hopper.

Builds Today's Roads





● Top: This Koehring 34E Twin-batch Paver operating on a street in Berwyn, Illinois, is typical of modern paving units. Center, left: Widely used in rock cuts and heavy excavation are 2-yard shovels like this Bucyrus-Erie. Center, right: An Allis-Chalmers Speed Patrol working near Chesterfield, Missouri. Bottom: An Austin-Western elevating grader is shown working on a county road.

• Left: Wooden dump wagons, used for some time after the introduction of tractors, held down capacities of excavators. Right: "double spotting" and modern trucks enable this ¾-yard shovel to attain maximum output in a borrow pit.

type with a 36-inch belt had an average loading capacity of about 80 cu. yds. per hour.

Much of the short haul work, where the material was loose or was such that it could be loosened by plowing, was handled by horse drawn scrapers. There were three types: slip scrapers, Fresnos and wheel scrapers. Two-horse drag or slip scrapers were used where the haul was less than 150 feet, and the amount of material to be moved was small. They generally hauled from 3 to 5 cu. ft. of pay load per trip depending on the nature of the material. The average production rate with fair material was about 5 cu. yds. per hour for a 50 ft. haul and 4 cu. yds. per hour on a 100 ft. haul.

Early Production Rates

For longer hauls and for larger quantities of earth, Fresno scrapers were used. These were built in three sizes, but the four-horse Fresno with a 5 ft. cutting edge and holding ⅓ cu. yd. of pay load was most widely used. The average rate of production was approximately as follows:

Length of Loaded Haul in Feet	Average Cu. Yds. Per Hr.
50	12.3
100	9.4
150	7.5
200	6.3
250	5.4
300	4.7
350	4.3

Under average conditions the maximum economic length of haul for Fresnos was about 350 feet. For longer hauls the horse drawn wheel scrapers were used. They were operated in a group or gang, with a snap team to assist each in loading and with a man in the pit to load and a dump man on the fill. The object was to have enough teams in the gang to keep the snap team and scraper loader in the pit busy. This number would increase as the length of haul increased. It was generally estimated that the number 3 wheeler under average conditions would produce at the following rate:

Length of Loaded Haul in Feet	Average Cu. Yds. Per Hr.
300	5.30
400	4.50
500	3.95
600	3.50
700	3.00
800	2.85
900	2.60

The economic length of haul for horse-drawn wheel scrapers was estimated to be about 800 feet.

Age of Mechanical Equipment

Beginning about 1924, the efforts to increase the output and to improve efficiency on grading operations by the use of improved mechanical devices began to show results. This has been called the beginning of the age of mechanical equipment. The next five years were marked by the general substitution of gasoline power for animal power. This change-over was dependent upon the development of devices for applying that power and equipment for using it.

Following this, came a five-year period (1929 to 1933 inc.) which saw an increased application of power and the use of larger units. The success of diesel power in effecting further economy of operation was outstanding during this period.

The last five years (1934 to 1938 inc.) may be called the era of refinement in design and increased capacity. In this period the trend was toward machines of larger capacity and greater speed and yet easier operation and control.

Throughout the three periods of the development of mechanical equipment, the increasing amount of earth moved per mile, greater width of work and increased hauling distances widened the margin of advantage of mechanical power over animal power. These same factors called for higher production rates, hence larger units which in turn increased the advantage of diesel engines over gasoline engines. The various steps in progression can best be stated by taking each of the five-year periods separately.

Gasoline Power Era

Steam shovels used in the previous era on highway construction were almost exclusively of ½ or ¾ cubic yard capacity. The introduction of gasoline power together with improvements in structural design made it possible to increase the size of shovels without appreciably increasing the weight. Greater mobility introduced at this time made them

(Continued on page 352)

CLEARING TIMBER *along the Mississippi*

R. Newton McDowell gets high speed and low costs using bulldozers to clean impounding pools to be used in maintaining a 9-foot navigation channel from St. Louis to St. Paul

A CLEARING job recently completed by R. Newton McDowell, of Kansas City, Missouri, illustrates an interesting and comparatively new use for the modern bulldozer. The job was located on the Mississippi River, about midway between Hardin and Batchtown, Illinois, and 60 miles north of St. Louis.

Between St. Paul and St. Louis, U. S. Army Engineers are planning to maintain a 9-foot navigation channel in the Mississippi. To do this, it is necessary to provide impounding pools at convenient points along the river. Water released from these pools will be used to maintain the channel level during the dry season.

Cleared 1,200 Acres

R. Newton McDowell has cleared land for several such pools, of which the one described here is typical, and shows the efficient method originated by this company. The job under discussion involved clearing trees and brush from a 1,200 acre site about five miles long. Work was started late in November, and completed about the middle of March. One 8-hour shift a day, six days a week was the operating schedule, with a maximum crew of 300 on the job at its peak.

General supervision of the work was the responsibility of Superintendent Wade Lahar, who has charge of all R. Newton McDowell operations in that territory. T. Welsh was in immediate charge of this particular job, with Allen

● A Bucyrus-Erie bulldozer mounted on an International TD-18 TracTracTor rears up on its "hind legs" in piling timber and heavy brush preparatory to burning.

● **Left: Large or small, they all rolled before the bulldozer blade. Note the upright bars welded on the blade to keep timber from rolling over on the tractor. Bottom: An Allis-Chalmers and a Caterpillar tractor hooked up in tandem skid in a big one to a central pile preparatory to burning.**

Brent resident engineer for the Army.

Hardwood Predominated

The site selected for the pool was thickly studded with hardwood timber; elm, maplewood, cottonwood, and sycamore predominating. The entire stand had to be removed so the timber would not rot when in water, fall and drift into the locks just below. Since the trees grew too thickly, and many of them were too big for economical "pushover" by the bulldozers, saws, axes and sinew were turned loose on the felling job. Trees, which ranged in size from bushes up to about three feet in diameter, were cut close to the ground. Stumps were not removed.

Large branches were trimmed by hand and then the bulldozers, usually working in pairs, moved in. Taking a roughly oblong area, the pair pushed trees and brush into a central pile. Felled timber from isolated spots was skidded into the nearest pile by tractor and chain method. As the timber came into the center of an area, the bulldozers "deckpiled" it, average dimensions of a "deck" being about 30 feet long, 15 feet wide and 8 feet high. To get the timber to the top of a pile, the tractors really had to "stand on their hind legs" and push. One of the accompanying pictures gives and idea of how close to the vertical the tractors sometimes came.

"Decks" are Fired

When a "deck" was complete, the bulldozers moved on and started assembling timber and brush from the next area. The completed deck was fired by hand by a crew which also threw miscellaneous small material on the pile. After the fire had gotten a start, one of the bulldozers came back and "opened" the pile to get the blaze really going.

It is interesting to note that the entire decking job was handled without use of cranes, the usual type of equipment for this work. The great flexibility of a fleet of tractors and bulldozers proved one of the important advantages in covering such a large area. About a hundred fires were going when the job was visited, and the crackling flames and billowing smoke made a picturesque scene.

Upright Bars on Bulldozer

Although the skidding method of timber gathering was used on this job, it was as a secondary method. With the bulldozer-equipped tractors, the contractor had a single unit which could handle both gathering and piling efficiently. As shown in the pictures, upright bars were welded on the bulldozer blades to keep timber

● Right: A bulldozer pushes a heavy timber right up on top of the pile in "deckpiling" operations. Bottom: A LeTourneau bulldozer mounted on a Caterpillar RD7 tractor pushes timber into a central pile. These piles averaged about 30 feet in length and 15 feet in width with a height of 8 feet.

from rolling over on the tractor.

Even so, the work was tough, requiring equipment adequate to stand up under hard usage. As one example: when the tractor had to climb on a burning pile to open it up, burning brush sometimes lodged in under parts of the tractors. The operator would have to stop and poke out the burning material.

Work Skillfully Planned

Difficulties of the job were minimized by skillful planning of the work, and operators who knew just how to do it in the least possible time. It was only necessary to watch the speed with which the piles were built up to realize the efficiency of the method.

Equipment on the job when it was visited included:

2 Caterpillar RD8 tractors, with Euclid and LeTourneau bulldozers.
1 International TD-18 TracTracTor, with Bucyrus-Erie bulldozer.
2 Caterpillar RD7 tractors, with LeTourneau bulldozers.
1 Allis-Chalmers Model "L," used for skidding.
1 Caterpillar RD7, skidding.
1 Allis-Chalmers 35, skidding.
1 International T-20, skidding.
1 International T-35, skidding.

OBITUARY

H. B. Blanks

H. B. Blanks of Vicksburg, Mississippi, president of H. B. Blanks and Company, levee contractors, died April 12 at Lexington, Kentucky.

A native of Trezevant, Tennessee, Mr. Blanks was employed by the Russe & Burgess Lumber Company of Cairo, Illinois, before organizing the firm that bears his name. His company was engaged with Driver & Company on a levee project on White River at the time of his death.

Mr. Blanks is survived by two daughters, Mrs. Lucius Butts of Natchez, Mississippi, and Mrs. W. G. Green of Jackson, Mississipi; two sisters, Mrs. Benny Clark of Fayetteville, Arkansas, and Mrs. Della Blanks Adams of Little Rock; and three brothers, William, Jeff J., and Robert Y. Blanks, all of Trezevant.

Funeral services were held at Vicksburg, Mississippi. Honorary pallbearers were L. Y. Williamson, Frank Stanford, C. J. Lowrance, Fred J. Beneke, Blair Lowrance, H. N. Rodgers, J. R. Taylor, S. L. Hunter, V. A. Long, F. S. Brown, Frank Schutt, J. A. Denton, T. B. Jones, P. H. Williams, T. L. James and John A. Riechman.

Editor's Note: Because it was possible to carry only a short obituary in our May issue we are publishing this additional information at this time.

The Bucyrus-Erie 10-B makes full use of its maximum reach loading from the excavation floor. The concrete section form at the right served as a handy ladder for workmen.

But Charles Lenz, Chicago, Illinois, excavating contractor showed them what a modern 3/8-yard shovel could do on a tough basement job.

AVERAGING about 53 yards per hour in material consisting of about 6% concrete, 30% hardpan, with a balance of sand and gravel, a 10-B Bucyrus-Erie 3/8-yard shovel proved to doubting Chicago contractors that it could handle this type of material speedily and efficiently.

Contractors on the Job

Basement excavation of the Lake-Oak Park Building, on the corner of Lake Street and Oak Park Avenue in Oak Park, Illinois, started early in March. Adams and Schroter, general contractors of the building, which is to house stores and offices in downtown Oak Park, gave the excavating contract to Charles Lenz, Chicago contractor.

Breaking up and removing the heavy foundation of Oak Park's old post office, which formerly occupied the site, and then digging out an area 158 feet by 130 feet to a depth of 13 feet was the man-sized job performed by the 10-B with the part time assistance of a Cat mounted Trackson shovel. Breaking concrete and digging 8,500 yards of difficult material in 20 days with nothing larger than a 3/8-yard shovel calls for efficient planning and operation. Charles Lenz actively supervised this job and his 25 years of experience in the excavating business is reflected in the satisfactory completion of the Lake-Oak Park Building excavation contract.

"She sure is easy to handle and she'll hold her own against many larger shovels for this type of work," said Thomas Cody, veteran shovel operator, who handled his first 10-B on this job and, according to the preceding figures, quickly accustomed himself to its easy operation. Cody's first task was the breaking up of the old post office foundation with a 3,000 pound "skull-cracker" chained to the bucket of the 10-B.

Excavation Made in Two Cuts

After sufficient breakage, the concrete was loaded out by the shovel. The balance of the excavation was handled in two cuts each about 6½ feet deep. This operation took full advantage of the 10-B's maximum dumping height of 12½ feet. Due to the high tail board of some of his trucks, Mr. Lenz found it convenient to raise the dumping body slightly, thus lowering the tail board and reducing the maximum dumping height necessary to load the trucks.

The 10-B kept a fleet of seven trucks busy hauling excavated material to vacant lots about 2½ to 3 miles from the job. The fleet, mounted on Firestone tires, consisted of 3 six-wheel Whites, 3 four-wheel Macks and a Ford. The Whites were of 6 yard capacity and the Macks and Ford held 4 yards.

A Caterpillar Diesel RD4 equip-

ped with a Trackson High Lift Shovel proved to be an able assistant to the 10-B. The RD4 kept the excavation floor clean and level, cleaned out the corners, and even pushed the trucks out of the excavation when they got stuck in the muddy spots. This unit came in when the job was about half completed and loaded a little over a thousand yards to trucks during the balance of the job.

Plywood Enclosure Used

Instead of the usual scrap lumber enclosure seen around excavations, Adams and Schroter erected a fence consisting of 6 foot sections of plywood reinforced on the inside by 2"x4" timbers. This makes a neat looking enclosure that is easily portable and inexpensive because it can be used many times. A simple, but very convenient use for the wooden concrete forms was their function as a handy, safe ladder to get in and out of the excavation.

Paul M. Schroter of Adams and Schroter estimates that about 2,000 yards of reinforced concrete will be poured for the foundation of the building. The concrete, made with Marquette cement, is being poured direct from the street level into sectionized wooden forms. A Jaeger pump is being used to keep the excavation floor free from water. Ruud-Nilsen Company holds the shoring contract on the building.

Mr. Lenz has handled a variety of basement excavation jobs. His latest operations have consisted largely of school basement excavations. These jobs, according to Mr. Lenz, averaged around four to five thousand yards apiece. Mr. Lenz states that he has found a ⅜-yard shovel ideal for this type of work. Despite the cold and rain of the early spring months Charles Lenz's policy is to get an early start and so lengthen his working season.

The Lake-Oak Park Building was designed and planned for the Lake-Oak Park Building Corporation by Samuel E. Bird, architectural engineer. Mr. Bird is a resident of Oak Park, Illinois.

"Sidewalk Superintendents' " Club

Adams and Schroter, general contractors, have encouraged the ever present "Sidewalk Superintendents' Club" by permitting a gap in the enclosure around the excavation large enough for a small, board platform complete with bench, rail and an awning for the comfort of Oak Park "Superintendents." From school boy to business man they all stop for a few minutes or longer to look at that most fascinating of all objects—a power shovel at work.

● **Right: "Sidewalk Superintendents' " club, complete with bench and rail. Later an awning was added. Left: The Trackson Shovel mounted on a Caterpillar RD4 was a busy helper to the 10-B. Bottom: Digging out the last strip. The foundation workers are getting an early start.**

Equipment

you ought to KNOW ABOUT

80-Ton Trailer-Truck

An interesting recent development in the heavy duty truck field is the completion of the "Super-Colossal" by the Dart Truck Company of Kansas City, Missouri. This giant of tractor-trucks is 10½ feet wide, 10 feet high and about 25 feet long. It is designed to haul a semi-trailer of 80-ton payload capacity. The chassis weighs approximately 35,000 pounds. Combined weight of chassis, trailer and load is in excess of 112 tons. This unit is operating over private roads in the coal mining area near Hume, Missouri.

The truck is powered with two six-cylinder Hercules Gasoline Engines. The engines are equipped to operate with butane for the fuel. Attached to each one of the engines is a large General Electric generator. Each generator drives a 125 horsepower motor and each electric motor drives one of the tandem rear axles. A shaft lever is required only for forward and reverse. The speed which is limited to 32 M.P.H. is controlled by a foot accelerator. Before completion of the 80-ton trailer the truck operated with two 40-ton trailers, consequently it towed considerably more weight than is expected of it with the 80-ton trailer.

Convertible Trailer

The C. R. Jahn Company of Chicago announce the latest Jahn trailer model, the "DHD-62D." Carried on 6 wheels, the new heavy-duty Jahn trailer has a capacity of 40,000 pounds. It is completely convertible to a semi-trailer without mechanical changes of any kind by removing the front dolly assembly, it is claimed. A standard size kingpin is used which will fit any regular semi-automatic fifth wheel.

Twin Filter Respirator

Willson Products, Inc., Reading, Pennsylvania, has announced a new low-resistance twin filter respirator for protection against both Type A and Lead Dusts. This respirator, designated as No. 752L, employs a small rubber,

form-fitting face piece so designed as to permit the wearing of goggles or spectacles without visual interference.

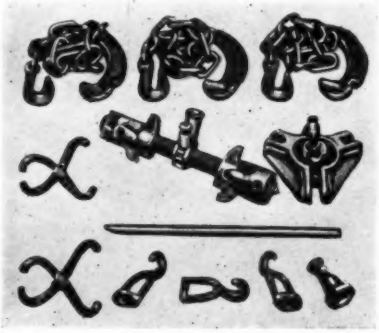
Power Control Unit

Better controlled power is now available through a new Power Control Unit — the Model T — claims R. G. LeTourneau, Inc., of Peoria, Illinois, and Stockton, California.

With an interchangeable neck and gear casing, it is now possible to have one gear for any size tractor from D4 to D8, it is claimed. One casing and several necks take the place of a full set of complete Power Control Units. Three different cable drum lengths—4, 7⅝, and 14⅝ inches —are available.

Util-A-Tool

The several pieces of equipment used in various combinations to perform jobs in production, construction and maintenance work has been designated the "Util-A-Tool" by its maker, Templeton, Kenly & Company, Chicago, Illinois.



The Util-A-Tool's many applications include: spreading and pulling together structural members or any movable objects; pushing; hoisting; lifting; lowering; clamping; bracing and tensioning. Five sizes are available at the present time.

Air Filter

The newly designed dry-type air filter, manufactured by Staynew Filter Corp., for small in-

ternal combustion engines, compressors, pumps and all "air-breathing" machines, offers important economies, it is claimed.

The Radial Fin Construction which the manufacturer states provides the largest possible filtering area in the smallest possible space, means free air flow and long periods of operation without cleaning. Both upright and hanging models are available in capacities ranging from 3 c.f.m. to 225 c.f.m. and in a wide selection of standard pipe sizes.

New Motor Grader

A new motor grader has been announced by Caterpillar Tractor Company, Peoria, Illinois. Called the No. 112, the new machine is available with either a gasoline or a diesel engine.

Four forward speeds with a low of 1.8, two intermediates of 2.7 and 4.3 respectively and a high of 10 m.p.h., give the machine a speed for any job it will undertake. Low pressure tired tandem or single drives are available. With the diesel engine and tandem drive, the No. 112 weighs 17,800 pounds, with more than 13,000 pounds of this weight carried by the driving wheels, it is claimed.

Standard equipment includes leaning front wheels and two braking systems, one hydraulic and the other mechanical.

Lightweight Compressors

The Sullivan Machinery Company, Michigan City, Indiana, announce the addition of a completely new line of portable air compressors known as the "ZEPH-AIR." The new line features compact construction, self starters and refinement of other details to provide extreme mobility and ease of operation.

Two sizes are available with capacities of 60 and 85 cubic feet per minute, respectively, of delivered air. Although these compressors have capacity to operate concrete breakers and rock drills, they are so small and compact that the two-wheel mountings can be towed by a pleasure car and the skid-mounted models can be mounted in the body of standard pick-up trucks, it is claimed. Bulletin A-24, describing the "ZEPH-AIR," can be obtained direct from the manufacturer, the branch office, or from any of the Company's many distributors.

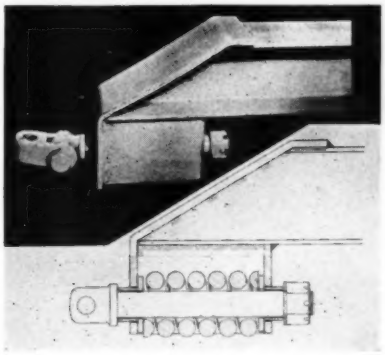
New Hand Wheel Control

A new series of "Select-O-Speed" Transmissions with hand wheel control is being announced by the Ideal Commutator Dresser Company, 4104 Park Avenue, Sycamore, Illinois.

These new models supplement the standard line from fractional to 7½ H.P. capacity that are equipped with lever type control. The hand wheel is recommended where finer speed adjustments and smaller increments of speed are necessary. By turning the wheel only a partial turn it is easy to change the speed only a few revolutions per minute, it is claimed.

Blaw-Knox Hitch

Blaw-Know Company announces production of a new design of hitch for its sheepsfoot tamping rollers. Heretofore it has been the practice on tractor drawn equipment to provide a compression spring which functions in the direction of forward pulling. The improved spring hitch is designed to function in both directions, thereby meeting the need for reduction of impact and shock loads whether the tractor is drawing or backing up, the manufacturer states.



New-Type Lubricator

To insure maximum efficiency in the lubrication of automobile and truck wheel-bearings, a new-type wheel-bearing lubricator has been perfected recently by Alemite engineers, and is now being manufactured by the Alemite Division of the Stewart-Warner Corporation, Chicago.

This new lubricator is adaptable to both ball and roller wheel-bearings on all modern makes of passenger cars and trucks, the manufacturers state. Use of the Alemite wheel-bearing lubricator results in an easily handled and thorough job of lubrication.

Vertical Syncrogear

The new U. S. Vertical SYNCROGEAR Unit Type GDV, complete with flange base, was designed by the U. S. Electrical Motors Engineering Staff to meet the conditions peculiar to vertical operation. This new vertical SYNCROGEAR unit incorporates a small geared oil pump which forces an ample oil supply to bearings, gears, and pinions.

The U. S. Vertical SYNCROGEAR is easily mounted, the manufacturer states. Further details may be secured by writing either to the Pacific Plant of U. S. Electrical Motors, Inc. located at 200 E. Slauson Avenue, Los Angeles, California—or to the Atlantic Plant at 80 - 34th Street, Brooklyn, New York.

EXCAVATING ENGINEER

FOUNDED 1905

A Monthly Publication
Devoted to the Excavating Industry

The Excavating Engineer Publishing Co.
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More Roads, More Jobs

America still needs more roads. Not only continent-spanning "super-highways" but a closely woven net-work of secondary roads to service the great majority of our population.

We have come a long way in our methods of highway construction and maintenance. Investigation and research by the Bureau of Public Roads and state and local highway departments have done much towards establishing the "where" and "what kind" of our national highway needs.

Before our highways can be at all adequate, there is still much to be done. At present our government is spending millions of dollars to create jobs for the unemployed. The portion of this money that has been used for road building projects has been well spent. We feel that every penny expended for the improvement of our highway system brings a hundredfold return in social, economic and cultural benefits to all our citizens. The point of diminishing returns has definitely not been reached, despite the diversionists' pleas that other worthy causes have a crying need for a good slice of the highway dollar.

A few years ago Germany started the construction of a super-highway system for the double purpose of curing its economic ills and strengthening its military defenses. When the full benefits of such a program were realized, it was decided that an even larger proportion of the public funds of Germany should be invested in highways, not only for the purpose of gaining the numerous benefits and advantages that result from the construction of better roads, but also as an important step in working out its employment problems. Germany had a gigantic unemployment list and, although only 400,000 men were utilized directly for highway construction, the nation's unemployment was reduced by several times this figure soon after its road program was started due to auxiliary employment.

The explanation is simple. If a thousand men are utilized to build and furnish materials for a highway, another thousand will be employed to build filling stations, garages, supply houses, salesrooms, service stations etc., that will open up along its route. Restaurants and hotels will be constructed. Homes, too, will have to be built for the men who own and operate these service facilities and the building of schools and other civic structures will soon follow. A little later, farm income will be raised by the expanding

(Continued on page 364)

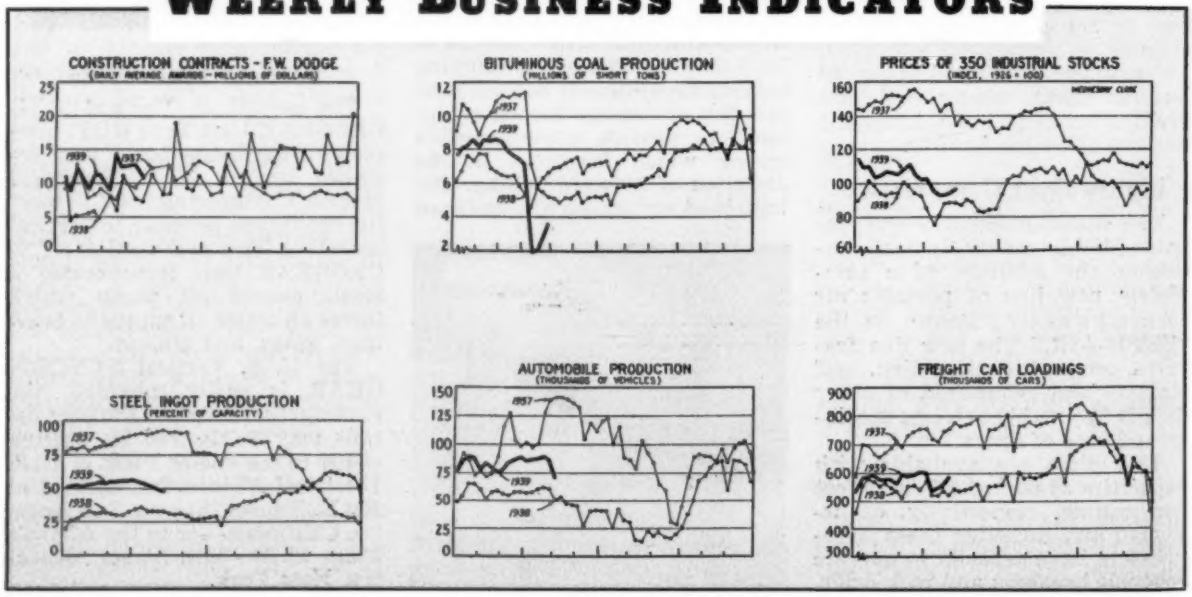
Business System Editorials

The editorial "Good Times and Bad Times" which appears on the next page is the eleventh in a series of twelve articles issued by the S. D. Warren Company. Articles which have appeared are:

Who Are Business Men?
Building a Business.
When A Business Grows.
Who Puts Up the Money?
Who Owns Business?
Should Business be Big or Little?
Who Pays the Taxes?
Who Determines the Wages of Employees?
What is Management?
The Competitive System.

Reprints of all these editorials and the one yet to be published are available for you at one cent per copy in lots of ten. Orders for ten copies of a single reprint are the smallest we can handle. If you wish to have the whole series. send $1.20 and we will forward ten copies of each of the eleven articles published thus far. Copies of the remaining editorial will be sent you next month.

WEEKLY BUSINESS INDICATORS



Good Times and Bad Times

WHEN THE majority of the 130 million Americans go on a spending spree, we have a boom. A depression is the "morning after" which follows a spree.

When business conditions are reasonably good for a continued period of time, people get debts paid off, and become optimistic, and begin to buy new things. This increase in buying makes business better, creates more jobs, makes people more optimistic, and causes them to spend more money, which makes business still better, creates still more jobs, and causes people to spend still more money, until finally, business is booming.

Employees, employers, contractors, doctors, politicians, wives, and children—all become optimistic when times are good, all spend with greater enthusiasm, and all help to make a boom in business. If it is wrong to create a business boom, then everybody is guilty of wrong, because everybody helps to make booms.

In boom times, factories, mines, and quarries operate at capacity, stores do a rushing business, building expansion means basements to be dug, and there are more jobs than there are people qualified to fill the jobs. Consequently business is forced to bid high for workers, and wage scales go up.

In boom times, employees and businesses make more money than they make in normal times, and nobody complains. But after the boom is over, politicians complain (for political reasons) that business men "profiteered" during the boom.

Politicians never speak of employees as "profiteers" because millions of employees would resent it, and would show their resentment at the polls. But it is a fact that when conditions produce extra profits for American business, they also produce proportionately extra profits or wages for American employees. This is quite proper. It is also quite natural, because business booms can occur only when the majority of 130 million Americans spend an abnormal amount of money. American business must sell to make profit; it must sell an abnormal quantity of goods to make abnormal profits. The workers of America, who are the users of goods and manufactured products (and are, therefore, the customers of America), can buy an abnormal quantity of goods only when they receive abnormal wages. So "profiteering" is possible only when everybody shares in it.

When a business boom continues for a time, people get used to it, and assume that it will continue indefinitely. Many employees spend all that they earn, and in addition buy things on the installment plan—to be paid for out of future earnings. Many business men contract ahead for materials, and for new buildings and machinery — to be paid for out of future earnings. Finally, the 130 million people of America discover that they have contracted for more things than they can use, or for more things than they can pay for.

As the American people begin to gradually realize that they have bought more than they can handle or pay for, many of them stop buying; then they begin to feel queer about their debts; and then they have to give up the things that they can't pay for. Mortgages on homes and on factories are foreclosed, companies fail, business gets very bad, jobs get scarce, and a depression results. Everybody takes some of the medicine, and nobody likes it.

Everybody shares in the troubles that are caused by depressions. Factory men and women work short time, get wage cuts, or lose jobs. White collar workers get pay cuts, or lose jobs. Managers get pay cuts, or lose jobs when their businesses fail or are reorganized. Investors lose their dividends, and part or all of their money if the business in which they have invested fails or is reorganized.

A depression is the payment for a wild time—the "morning after" the spree. The length and severity of a depression is proportionate to the length and intensity of the spree or boom that preceded it. As long as there are booms, there will be depressions.

The only way to prevent depressions is to prevent booms—but that's difficult to do. Business men can't stop the rest of the 130 million Americans from getting too enthusiastic. The government can't stop 130 million Americans from getting too optimistic. Anyway, business men and politicians are merely people, and they get just as optimistic as anybody else.

Of course the government might stop booms and prevent depressions by passing laws to regulate and to control the spending of every individual in America. In that case, government officials would have to dictate how much each person could spend, when he could spend it, and how he should spend it. To make a proper use of that power, our government would need to be made up of a great many perfect men who could see into the future, who would never make mistakes, and who could be trusted to be unselfish forever.

There are no perfect men.

General Motors ushers in A NEW DAY for DIESELS on CONSTRUCTION JOBS

Simpler even than gasoline engines to operate and service, dogged as steam engines in their ability to "hang on"—GM Diesel Packaged Power units bring you Diesel economies without the usual "ifs," "ands," and "buts."

YOU know the Diesel's common advantages—its economy, its lack of fire hazard and how it stops fuel pilferage.

But that's only the beginning of the GM Diesel's story. Equally important are its *operating* advantages over gasoline engines, steam engines—and, yes, other Diesels too!

It's a simpler Diesel, for one thing.

Built on the General Motors 2-cycle principle, it fits in about the same space as gasoline engines of comparable power—may be installed in any of your present gasoline-powered equipment with a minimum change-over. And because every down-stroke in a GM Diesel is a power-stroke—not just every other down-stroke as in 4-cycle engines—there is materially less piston travel and wear.

What's more, it comes in com-

GENERAL

For your convenience in writing to General Motors Sales Corporation, you will find a card bound in this issue.

pletely engineered *Packaged Power* units of from 15 to 90 hp. (continuous rating)—fully equipped for either portable or stationary use, all set to go.

No "experts" are needed to operate the GM Diesel—nor to keep it on the job. No special fuels or lube oils are required in its diet. It performs smoothly, quietly on almost any commercially available fuel oil and without the usual heavy smoke exhaust.

Two new General Motors developments are responsible for that: a Unit Injector and Fuel Pump that ends the need for long, high-pressure fuel lines and improved Uniflow *Blower* Scavenging, which—in one sweep—thoroughly cleans out the burnt gases and refills each cylinder with fresh air.

Here the fuel is evenly atomized for more complete combustion. While at *each* period of injection, there's positive timing control.

In practice—on shovels, cranes, draglines, bulldozers and dump trucks—it answers the demands of variable loads with an alertness and flexibility that even gasoline engines can't match, "holds on" with the tenacity of a steam engine.

And in all construction service—with compressors, pumps, ditchers and crushers, too—it can be counted on to provide consistent savings, undiluted by extra service costs you once considered Diesel "musts."

For the GM Diesel is purposely built for continuously dependable service in isolated spots as well as those convenient to sources of service and supply—to behave as well for unskilled operators as for the engineers who designed it.

Simplified Servicing

It is mass-produced, with standardized, readily replaceable parts that are interchangeable cylinder for cylinder and engine for engine. Thus the life of the GM Diesel is literally endless, its maintenance reduced to the utmost simplicity.

And now a nation-wide dealer organization is ready to demonstrate what GM Diesel Packaged Power can do for you—is doing for others—in making tough jobs easier and all jobs more profitable. Write for name and address of nearest dealer.

DIESEL ENGINE DIVISION
GENERAL MOTORS SALES CORPORATION
Cleveland, Ohio

MOTORS DIESEL

GM GENERAL MOTORS DIESEL POWER

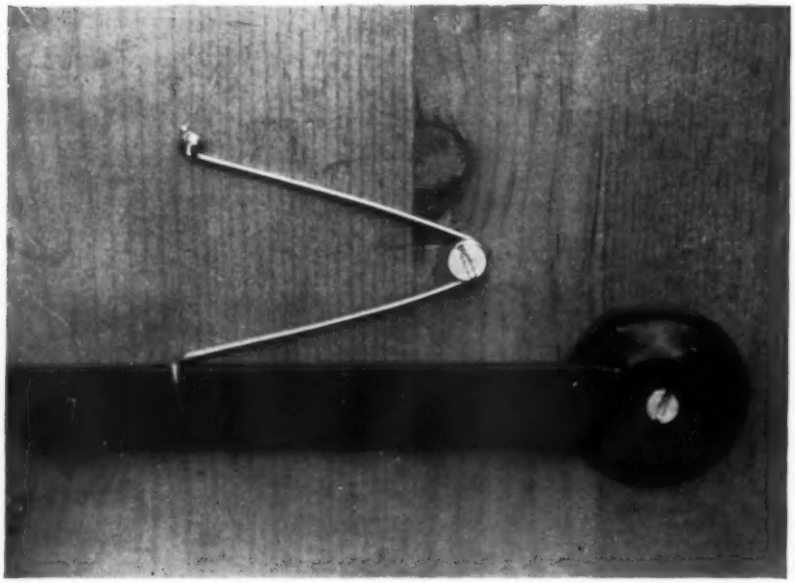
For your convenience in writing to General Motors Sales Corporation, you will find a card bound in this issue.

Field NOTES

Safety Pin Makes Convenient Door Latch Holder

The usual double handle door latch is the most convenient device for cab doors and openings during the cold weather, as it can be operated easily from both sides with heavy gloves or mittens protecting the hands and fingers. These latches are often applied to doors, cabs, portable tool houses, and other constructions where vibration makes it hard to keep the latch down in place. A slamming door invariably throws out such a latch.

To remedy this, install the spring portion of a large or common blanket safety pin over the top of the latch bar as shown. First pry off the hood or shield of the pin and bend that end down over the bar into the shape of a double L covering both the top and the sides of the strip. Clip off the point from the other part of the pin and bend around a small screw, compressing the spring firmly over the bar when down in latched position. The large or pivot screw should be of a size under the head to just fill the eye loop or coil. This simple attachment will keep the door securely latched at all times and insure it going into latched position when the door is closed.—*F. W. Bentley*



• This is how the spring section of the blanket safety pin appears when in use. Pressure on the bar is great enough to hold it down despite vibration.

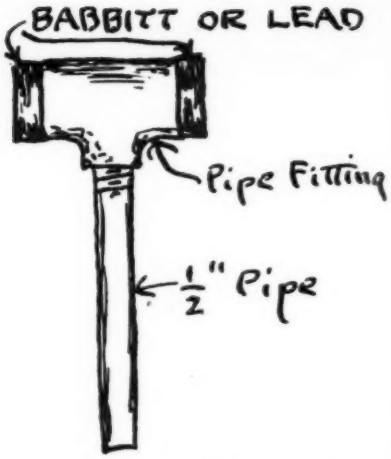
A Good "Soft Hammer," Easily Made

The useful and easily made soft hammer, shown in the accompanying sketch, is nothing more or less than an ordinary standard "Tee" pipe fitting and a half inch pipe. The former, when filled with lead or babbitt, serves as the hammer head, and the latter is the handle.

For pouring, moulds are unnecessary. Simply wrap paper around the rim to form the face of the hammer and to keep the lead from spilling when the metal is poured. It isn't necessary to fill the Tee entirely full of molten metal; pieces of scrap metal or anything non-combustible may be used to fill most of the space. Scrap pipe plugs, for instance, are good fillers.

A hammer like this can be made in almost any desired weight because there are so many standard sizes of pipe fittings. The one illustrated weighs about four pounds.

For striking and driving bolts, nuts, shafts, pipe, and similar machine parts that must not be scratched or battered there is nothing better than a soft lead or babbitt-faced hammer. Rawhide-faced hammers and wooden hammers do not scratch or batter, but they usually are not heavy enough for good performance. — *W. F. Schaphorst, M. E.*



• A rough sketch of the easily made "soft hammer." A hammer of this type will serve a variety of uses on the job.

Construction of Old National Road "Stumps" Builders

By John R. Marcy

The specifications for the construction of the pioneer National Road, the granddaddy of our modern super-highways, form an interesting comparison with those of today. In June, 1829, specifications for the road through Ohio and Indiana were published. They called for a roadbed 80 feet wide with a central section 30 feet in width covered with broken stone a foot deep and topped with a layer of gravel. All stumps were to be grubbed up and removed entirely from the central strip. On either side of the 30 feet all timber was to be cut and removed. All hills were to be cut down and all valleys filled so that no grade should exceed 4 degrees when the road was completed.

For that time, this was not bad, even in the light of modern construction, but it didn't work out that way. Investigation soon showed that such an amount of timber cutting and stump grubbing was not practicable. It would have exhausted the appropriation almost before the actual highway construction was begun. In August, therefore, the specifications were amended and new ones issued. They read as follows:

"The central part of 30 feet to be cut in the following manner, to

(*Continued on page 364*)

Diesel-lubricating Victory

No Matter What Engines You Use YOUR DIESELS STAY CLEAN AND WEAR-RATE HITS A NEW LOW

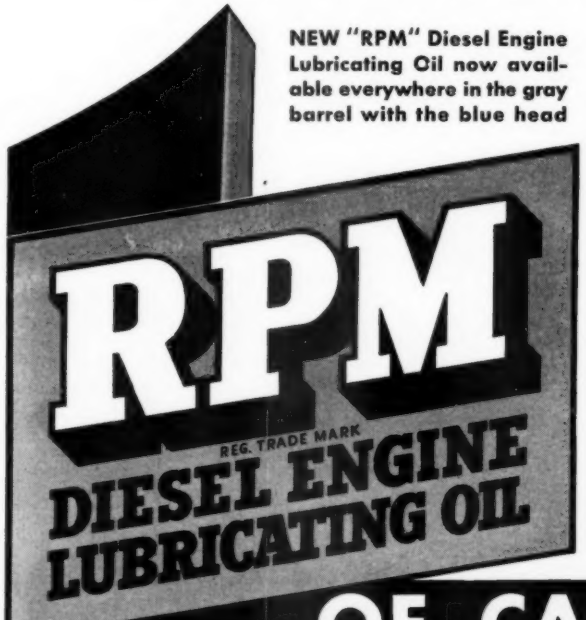
NEW "RPM" DELO solves your Diesel engine lubrication problems. In EVERY Diesel, in any kind of service, on land or sea, it combines clean-engine performance with full protection for every type of bearing—Babbitt or alloy.

Actual engine tests, conducted for thousands of hours—millions of miles—show that NEW "RPM" DELO keeps all types of alloy bearings in perfect condition. And it keeps rings free—pistons clean—filters unclogged—oil passages open under all kinds of heat and load conditions.

No other oil in our experience—or yours—is able to match this performance. We, therefore, say without hesitation that NEW "RPM" DELO (in proper S. A. E. grades) is UNEQUALED by any oil, in Diesel engine lubrication.

Ask our Representative or your nearest Distributor to see the Engineers' Report on NEW "RPM" DELO, complete with charts and unretouched photographs of our conclusive engine tests! Your own experience will prove every statement in it.

The sooner you begin using NEW "RPM" DELO, the sooner you will solve your Diesel engine lubricating problems—and cut maintenance costs to the minimum. Better start now!



NEW "RPM" Diesel Engine Lubricating Oil now available everywhere in the gray barrel with the blue head

Order from Your Nearest Distributor as Listed Below:

IN THE UNITED STATES

"RPM" Diesel Engine Lubricating Oil:
The California Company (Montana only)
Humble Oil & Refining Company
Standard Oil Company (Indiana)
Standard Oil Company (Nebraska)
Standard Oil Company of California
Standard Oil Company of Texas
Utah Oil Refining Company

Diol "RPM" Diesel Engine Lubricating Oil:
The Carter Oil Company Tulsa, Oklahoma
Colonial Beacon Oil Company
Standard Oil Company of Louisiana
Standard Oil Company of New Jersey
Standard Oil Company of Pennsylvania

Kyso "RPM" Diesel Engine Lubricating Oil:
Standard Oil Company (Inc. in Kentucky)

Signal "RPM" Diesel Engine Lubricating Oil:
Signal Oil Company

Sohio "RPM" Diesel Engine Lubricating Oil:
The Standard Oil Company (Ohio)

IN CANADA

"RPM" Diesel Engine Lubricating Oil:
Imperial Oil Company Limited
Standard Oil Company of British Columbia Limited

THROUGHOUT THE WORLD

"RPM" Diesel Engine Lubricating Oil is also available through distributors in more than 100 other countries. Get in touch with your nearest distributor.

OF CALIFORNIA

For your convenience in writing to Standard Oil Company of California, you will find a card bound in this issue.

Shots from the FIRING LINE

Congress Allots $63,000,000 for Reclamation Projects

Appropriating the largest amount of money ever set aside for reclamation purposes Congress has recently passed the Department of Interior Bill. The $63,000,000 bill is $23,000,000 more than the amount allotted the Reclamation Bureau last year. This sum will enable the reclamation program to be met by the regular appropriation, while last year emergency funds were largely used.

It is understood that of the funds to be made available for the new fiscal year beginning July 1, the largest portion will be used to continue construction work on reclamation projects already under way. However, it also means that new contracts will be let for numerous jobs.

An important item in the reclamation measure for the coming year provides $5,000,000 for many small projects in the Great Plains area. This money is made available to the President for allotment to these projects, which include the states of North and South Dakota, Wyoming, and Nebraska embraced in the Great Plains drouth area. A similar appropriation was contained in last year's emergency appropriation, but Congress at that time threw such restrictions around the use of the money that it was not found practicable to start the work. These restrictions have been eliminated in the present measure, and plans for the construction work on this project are now being drawn.

• The Bell Clay Company of St. Louis, Missouri, is using this TracTracTor TD-18 and Bucyrus-Erie 4-wheel Scraper unit in a clay pit at Gleason, Tennessee.

More Bids on the Pennsylvania Turnpike

Contractors' bids for grading, drainage, and erection of 20 concrete structures along 12.68 miles of the 160-mile Pennsylvania Turnpike have been opened by the Turnpike Commission.

Apparent low bidders on the three sections into which the mileage was divided submitted bids totalling $1,253,025.47.

On the first contract, a 3.05-mile section in Somerset township, Somerset County, the apparent low bidder was Connell and Laub Construction Company of Dayton, Ohio, which asked $240,532.48 for the job. This company has another contract, also in Somerset County. Thirteen bids were opened, ranging up to $322,763.37.

Unofficial low bidder on the second section, a 5.53-mile stretch in Dublin townships, Fulton and Huntingdon Counties, was L. M. Hutchison of Mount Union, Pennsylvania, who set a price of $429,781.78. Hutchison has another contract in Cumberland County, the first contract awarded by the Commission. Ten bids were opened, ranging up to $436,274.86.

On the third section, covering 4.10 miles in Mount Pleasant township, Westmoreland County the unofficial low bidder was Frank Mashuda of Milwaukee, Wisconsin, with a $582,711.21 proposal. This contract includes erection of four drainage structures and two overpasses. Bids of four other contractors ranged up to $671,581.29.

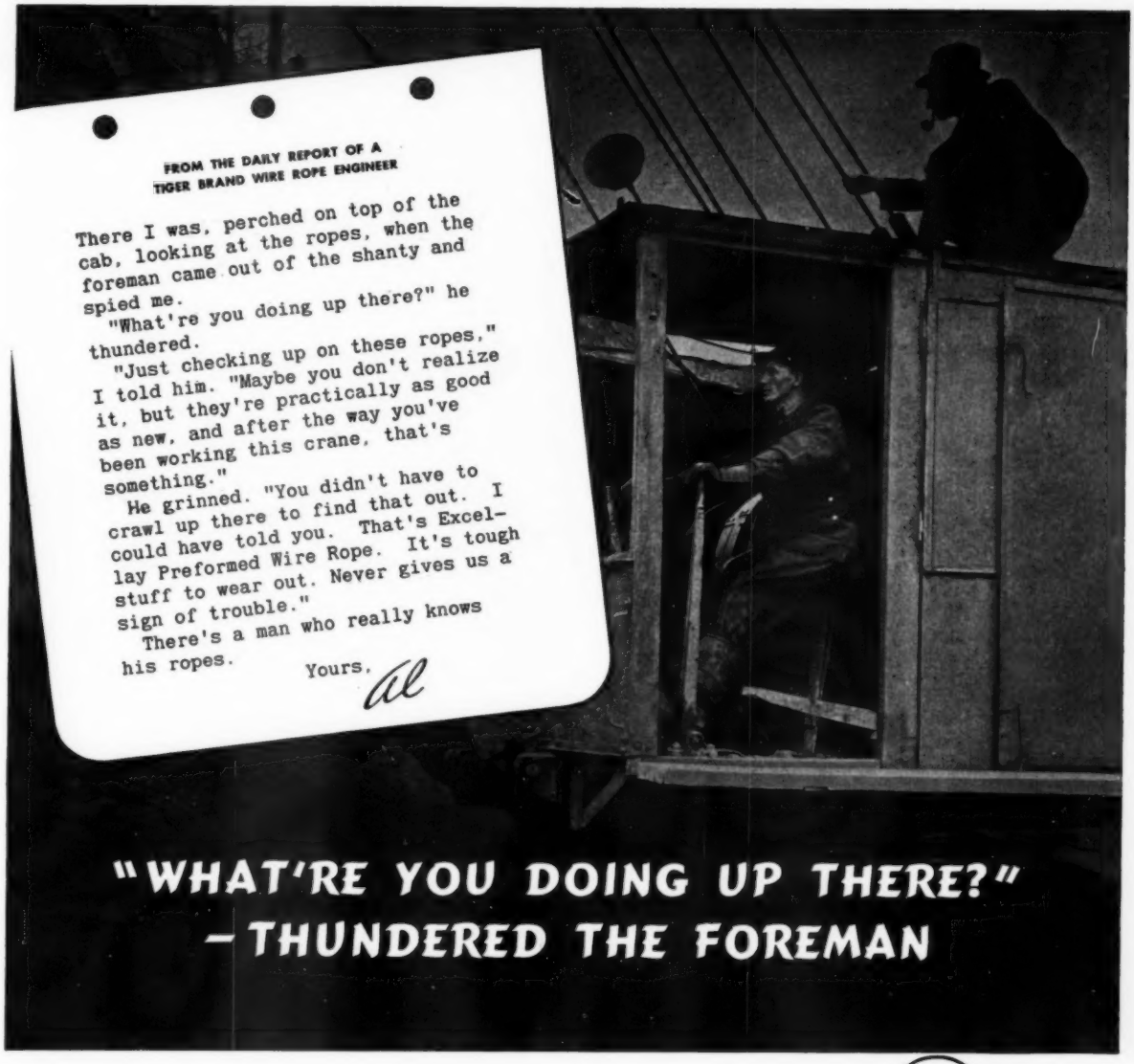
Bates & Rogers, of Chicago, Illinois, have submitted an unofficial low bid of $2,920,123 to the Pennsylvania Turnpike Commission for construction of Kittatinny and Blue Mountain Tunnels and approaches in Franklin County.

The tunnels, located in Fannett and Lurgan Townships, will be the third and fourth awarded on the 160-mile Pennsylvania Turnpike.

Approximate quantities of principal items include: 318,550 cubic yards of excavation and borrow; 184,470 barrels of concrete and 5,098,500 pounds of steel.

Of all the tunnels on the old South Penn Railroad to be utilized, Kittatinny

• This Galion Road Grader, equipped with a Wisconsin Motor, is working on a new road project in northern Wisconsin.


FROM THE DAILY REPORT OF A
TIGER BRAND WIRE ROPE ENGINEER
There I was, perched on top of the cab, looking at the ropes, when the foreman came out of the shanty and spied me.
"What're you doing up there?" he thundered.
"Just checking up on these ropes," I told him. "Maybe you don't realize it, but they're practically as good as new, and after the way you've been working this crane, that's something."
He grinned. "You didn't have to crawl up there to find that out. I could have told you. That's Excellay Preformed Wire Rope. It's tough stuff to wear out. Never gives us a sign of trouble."
There's a man who really knows his ropes.
Yours, Al

"WHAT'RE YOU DOING UP THERE?" —THUNDERED THE FOREMAN

OUR field engineers are interested in seeing that you get a full dollar's worth of value out of every dollar you invest in wire rope. Most of their time is spent right out where the rope is used. There's no better place to keep in touch with wire rope performance.

That's why these engineers are qualified to give you service that is both helpful and speedy. Besides helping you select the most practical wire rope, they can often give you valuable, money-saving tips on operation. Be sure to take full advantage of their wide experience.

American Tiger Brand Wire Rope is made in all constructions and grades. Our engineers can help you specify the type best suited to your job. Ask one of these men to call.

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is the nearest in completion. The original railroad builders bored 4,032 feet of the total length of 4,779 feet, leaving 747 feet yet to be driven. Of Blue Mountain tunnel's length of 4,385 feet, there remains 1,322 feet to be bored.

A total vertical climb of 1,437 feet is avoided by use of these two tunnels. Kittatinny Mountain towers 707 feet above the tunnel portal, and Blue Mountain is 730 feet higher than the tunnel. The elevation of the tunnels are 1,068 feet and 1,042 feet, respectively.

Award Shasta Dam Power Machinery Contracts

Secretary of the Interior Harold L. Ickes has awarded two contracts totalling $1,911,255 for power machinery to be installed in the great power plant at Shasta Dam of the Central Valley reclamation project in California.

The machinery covered by the contracts includes four turbines of 103,000 horsepower capacity, four governors to control these units, and two turbines of 3,500 h.p. and two governors to control these units.

The large turbines are for Units 1, 2, 3 and 4 of the main Shasta Dam power plant. They compare in size with the 115,000 h.p. turbines installed at Boulder Dam and with the 150,000 h.p. turbines which will be used at Grand Coulee Dam.

Units 1, 2, 3 and 4 will comprise the initial installation at Shasta Dam. This installation will have a rated capacity of 412,000 h.p., which compares with the capacity of the installation on the American side at Niagara Falls rated at 452,500 h.p. and with rated capacity of the Conowingo plant of 378,000 h.p. The ultimate installation at Shasta Dam will include one additional 103,000 h.p. unit.

The small turbines ordered will be used in the station-service generating units, the power from which will be used in operation of the machinery and for other purposes at the dam.

The first contract covering the four great turbines and the four governors for these units, was awarded to the Allis-Chalmers Manufacturing Company, of Milwaukee, Wisconsin, on its bid of $1,843,200. The second contract, covering the two station-service turbines and the two station-service governors, was awarded to the James Leffel & Company, of Springfield, Ohio.

California County Considers $12,000,000 Water Program

Santa Barbara County, California, has received a report on a proposed water control and development program that will cost an estimated $12,000,000.

The engineering study prepared by a Los Angeles consulting firm was authorized by the county supervisors in order to formulate a comprehensive program for conservation work to stabilize development of the county, find a solution to flood control problems, and provide for the conservation and use of surplus water supplies.

Briefly, the plan calls for the construction of the Tequepis dam, a rolled earthfill structure of more than 1,000,000 cu. yd., which would involve a cost of over $3,000,000, including necessary outlet works, river control and highway relocation. The reservoir formed by this dam would impound about 65,000 ac. ft., which would provide flood protection benefits and the stored water would then be delivered by tunnel and conduit system to coastal areas for agricultural and domestic use.

The program also provides for increasing the size and capacity of the existing Gibralter dam by the addition of 2,000,000 cu. yd. of fill to increase storage from about 10,000 to 50,000 ac. ft.

The report is now under consideration by the county supervisors and the county planning commission.

Coal Men Invade Cincinnati

Thousands of coal mine executives and operating officials invaded Cincinnati during the last week of April for the 16th Annual Coal Convention and

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• **Five LeTourneau Carryalls working on the construction of the new and shortest route between Spokane and Seattle, Washington. M. L. O'Neil & Son of Eugene, Oregon, are the contractors.**

Exposition of the American Mining Congress.

They gathered from every coal producing field of the country to marshal their forces for the progress and advancement of their industry. The difficult problems of coal mining today have served to bring into sharp focus this important industry gathering.

Beset by the intricacies of federal regulation and harassed by the inroads of competitive fuels, the coal mining industry is determined to win its fight. Present difficulties were subjected to careful analysis at this annual convention, and mining men returned to their operations well fortified by their four-day parley.

The underlying theme of the Convention was the modernization and mechanization of mining operations. The past fifteen years have witnessed the most phenomenal advances since coal was first mined, and the immediate future promises an even faster pace.

Bonneville Project Administrator Named

Frank A. Banks, construction engineer of the Grand Coulee Dam project, has been appointed by Secretary of the Interior Harold L. Ickes as Acting Administrator of the Bonneville Project to succeed the late John Delmadge Ross.

Mr. Banks, 57 years old, is a graduate of the University of Maine in civil engineering and has been employed continuously by the Bureau of Reclamation since 1906. He worked up through the field service of the Bureau to the position in 1917 of construction engineer of American Falls Dam in Idaho, and in 1920 went to the Owyhee Project in Oregon as construction engineer of the great Owyhee Dam, then the outstanding engineering structure in the world. In August 1933, when the Grand Coulee Dam Project was begun Frank Banks was assigned to the job as construction engineer and he has supervised the work since that date.

While Acting Administrator of the Bonneville Project Mr. Banks will continue as construction engineer of Grand Coulee Dam.

Secretary Ickes also announced the appointment of Barry Dibble, an outstanding electrical engineer whose home is in Redlands, California, as Assistant Administrator of the Bonneville Project to work with Mr. Banks and to represent him at the Portland, Oregon project office.

Chicago Tunnel Contract Awarded

Merritt-Chapman & Scott Corporation, general contractors, Philadelphia, Pennsylvania, were the low bidders on Contract S-4A for the tunnel under the Chicago River Crossing for the State Street Subway of the City of Chicago.

This $476,650.26 contract awarded by the Department of Subways & Traction is part of the total job being pushed by Mayor Edward J. Kelly and Philip Harrington, Commissioner. It requires not only the construction of the river crossing tubes 200 ft. long with twin roadways, but excavation and dredging of the river crossing section and the construction of 65-ft. cofferdams at both ends of the twin tube section.

The tubes will be of steel construction, concrete covered and will fit into the cofferdams which will be unwatered to a depth of 52 ft. below the surface of the river.

Low Bids on Shasta Dam Railroad

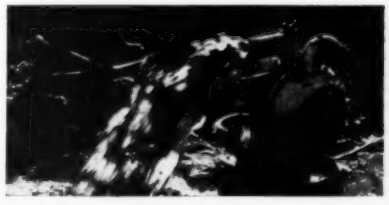
R. G. Clifford, San Francisco contractor, submitted the lowest bid of $1,223,186.40 to the United States Bureau of Reclamation for four miles of railroad construction around the Shasta Reservoir site. Bates & Rogers Construction Corp. of Oakland was second low at $1,227,550.05.

The job includes grading the roadbed from the O'Brien Creek bridge about 20 miles north of Redding to the second crossing of the Sacramento River at Pollock. This four-mile section includes

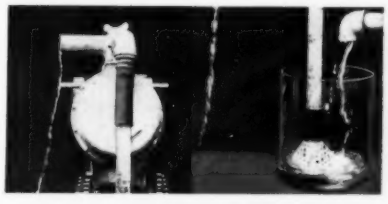
No Delays

with this fast-working pump on the job . . .

GETS THERE QUICKER. A Homelite Portable Pump is the handiest thing you can have when water gets on the job. It's small and compact. You can rush it around easily —to places other pumps couldn't reach. One man can carry it. Weighs only 91 pounds complete with built-in gasoline engine.



DRIES THE PIT QUICKER. In action, a Homelite shines. Gushes 15,000 gallons per hour. Handles thick mud and sand without clogging. Has a 28 foot suction lift. Keeps going, without manual attention, day in and day out under toughest working conditions.



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The shovels you buy mean your bread and butter. Every hour they are working means so many dollars in your pocket; every hour they are idle because of breakdown, moving or other reasons means a loss of profit-dollars plus additional dollars for out-of-pocket expense. Your machines may mean the difference between your success and failure. Consequently, before you invest thousands of hard-earned dollars in an excavator, we suggest that you investigate thoroughly. Be sure you get the machine that can make the most profits for you — don't be mislead by a cut price or a big trade-in — what counts is not so much the price you pay as the net result when the books are closed!

Perhaps you'll buy a Bucyrus-Erie — perhaps not. Either way, we wish you luck. The thing that is important, it seems to us, is that you get the right machine for your job — the machine that will make YOU the most money.

We try to build that kind of machine for you. Look Bucyrus-Erie over when you are considering buying a machine. There is no obligation — our salesmen will try to show you the value to YOU of our machine. They will answer your questions frankly, honestly, and in as much detail as you wish. Their interest is not so much in securing this immediate sale but in making you one of our permanent customers — see Bucyrus-Erie before you buy!

B26

Bucyrus·Erie

SOUTH MILWAUKEE, WISCONSIN

three tunnels having lengths of 3,235 feet, 1,610 feet and 915 feet.

Twenty miles of the 30-mile railroad relocation are under construction. Six miles remain to be advertised for construction.

Flood Control Budget Increased

Budget estimates on flood control and river and harbor improvements were increased $50,000,000 last month as the House of Representatives passed the non-military bill for the fiscal year beginning July 1. The appropriations were $39,000,000 for Mississippi River Flood Control, an increase of $2,000,000 over the Budget; $133,000,000 for National Flood Control, an increase of $23,000,000, and $55,000,000 for new river and harbor work, an increase of $25,000,000. The bill also carries $41,000,000 for river and harbor maintenance. The bill was passed after a severe fight. The ground-work for increased funds was laid by a flood control bloc led by Congressman Will M. Whittington of Mississippi.

T.V.A. Promotions and and Transfers

Promotion and transfer of six Tennessee Valley Authority engineers as a result of expanded construction activity at Gilbertsville Dam and initial work on the Watts Bar project was announced today by John B. Blandford, Jr., General Manager of the Authority. Those affected are Lee G. Warren, Eugene A. Prokop, Benjamin S. Philbrick, James B. Hays, Joseph K. Black, and Frank W. Webster.

Mr. Warren, Project Engineer at Chickamauga Dam, now becomes Project Manager of both the Chickamauga and Watts Bar projects.

● For loading and hauling gravel to be used for road surfacing, the State Road Commission of Maryland working out of the Princess Anne District on the eastern shore of the Chesapeake Bay, uses this Bucyrus-Erie 10-B Clamshell and FWD Truck.

Mr. Prokop, Acting Construction Engineer on the Gilbertsville project, has been appointed Reservoir Construction Engineer. He will assist Mr. G. P. Jessup, Gilbertsville Project Manager, in exercising engineering supervision over all construction work in the area except that connected directly with the dam and appurtenant structures.

Mr. Philbrick is being transferred from Construction Superintendent at Guntersville Dam to Construction Superintendent at Gilbertsville.

Mr. Hays, now serving as Construction Engineer at Chickamauga Dam, becomes Construction Engineer of the Gilbertsville project. He is being replaced at Chickamauga by Mr. Black, present Assistant Construction Engineer of the Chickamauga project.

Mr. Webster, Principal Highway Engineer, in the Engineering Design Department, becomes Head Highway Engineer.

Protect Children from Blasting Caps

During the year 1936, 213 children were injured by blasting caps, a decrease of 9.4% from the preceding year, according to an announcement by the Institute of Makers of Explosives.

Small decreases in the number of accidents have been reported in recent years. In 1935 there were 235 children injured and 246 in 1934.

The three most common types of accidents were from throwing the caps in bonfires, striking them with a hammer or rock, and holding a lighted match

Any man who uses one will tell you the Haiss Bucket is TOPS today!
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HERCULES EXPLOSIVES

For Contractors

Hercules explosives available to contractors include all the old standard dynamites, plus grades that were developed especially to reduce cost and promote efficient blasting on contractor's jobs. Among the explosives listed below, one or more will be found that is adapted to the work you have in progress or in prospect.

Gelamites*1 and 2— The original semi-gelatin. Gelamite 1 replaces 60% gelatin and Gelamite 2 replaces 40% and 50% gelatin, cartridge for cartridge, at a saving of 10% to 15%. Lower strengths of gelatin are replaced by Gelamite 2 at a saving by reducing the number of cartridges in the charge. The Gelamites are sufficiently plastic and water resistant for most work.

Hercomites*2 to 7— The Hercomites, high-count ammonia dynamites, are the most economical explosives available. They are particularly suitable to open work, where they frequently save from 10% to 30% when substituted for Extra L. F. or other grades. Hercomite Bag is a free-flowing explosive and is the most economical bag powder.

Cartridge for Cartridge Replacement Table

Comparison of Hercomite 2 to 7 With Other Explosives

	Approximate No. 1¼" x 8" ctgs. per 100 lb.	Approximate weight strength	Nearest Extra L. F. grade by bulk
Hercomite 2	240	65	50%
Hercomite 3	260	65	40%
Hercomite 4	280	65	40%
Hercomite 5	306	65	30%
Hercomite 6	330	65	25%
Hercomite 7	350	65	20%

*Reg. U. S. Pat. Off. by Hercules Powder Company.

Extra L. F. Dynamite — Strengths: 20% to 60%. 108 to 110 cartridges, 1¼" x 8", in 50 lbs. For general all-round work. Extensively used for clay blasting, road construction, stump and boulder blasting, quarrying, and electrically fired ditch blasting.

Straight N. G. L. F. Dynamite— Strengths: 15% to 60%. 104 to 110 cartridges, 1¼" x 8", in 50 lbs. Sensitivity of the 50% and 60% grades adapts them to propagated ditch blasting, and for accelerating fill subsidence in constructing roads through swamps. Also used for demolition (40%-60%), mudcapping hard boulders (40%-60%), and submarine blasting (60%).

Herculites — Strengths: 20%, 30%, and 40%. They are free-flowing, ammonia type powders, packed in bags. Satisfactory for general blasting where free-flowing powders of this strength are needed. Herculite 2 (20%) is used for gully blasting in controlling soil erosion.

Gelatin L. F. — Strengths: 20% to 80%. 87 to 102 cartridges, 1¼" x 8", in 50 lbs. It is dense and plastic; is more water resistant, less bulky, and produces a smaller amount of objectionable fumes than other high explosives. Particularly desirable where concentrated loads, or great resistance to water, is required.

Gelatin Extra L. F.— Strengths: 30% to 90%. 90 to 104 cartridges, 1¼" x 8", in 50 lbs. Water resistance and fumes satisfactory for tunnelling, mining, and quarrying. Gelatin Extra L. F. has almost entirely replaced Gelatin L. F. grades for reasons of economy; but for the same reason, Gelatin Extra L. F. is often replaced by the Gelamites.

Blasting Gelatin — Strength: 100%. 103 cartridges, 1¼" x 8", in 50 lbs. The strongest and fastest commercial explosive. It is dense, waterproof, and has excellent fumes. Used for shooting oil and gas wells, for loading in the bottom of deep well-drill holes in very hard rock, submarine blasting, cut holes in hard-rock tunnelling.

USE THIS COUPON FOR FURTHER INFORMATION ABOUT THESE EXPLOSIVES

HERCULES POWDER COMPANY

Incorporated

Wilmington, Delaware

Please send further information on Hercules explosives for contracting.

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For your convenience in writing to Hercules Powder Company, you will find a card bound in this issue.

● Dragline dredge operations conducted by Ferris & Marchbank in a picturesque setting. The Bucyrus-Erie class 111 dragline fills the hopper of the "doodlebug" with placer gravel. The operation is at Grangeville, Idaho.

under them, the Institute records show. Picking out the explosive with a pin or nail also causes many injuries. Each year several hundred children are blinded or their hands, faces, arms and legs mangled. Some deaths have been reported.

The caps get into the hands of children through the carelessness of users. Workmen leave them around following blasting operation. Sometimes they are carried home by workers and left about where children can find them.

New Division Head for A.R.B.A.

John A. Long, former engineer of Duval County, Jacksonville, Florida, has been appointed engineer-manager of the County Officials' Division of the American Road Builders' Association, Washington, D. C.

The association will undertake an expanded program of County Division activity during the next seven months. Mr. Long will have full responsibility for the policies and management of this important branch of the association's work.

The activity he directs will include the organization and administration of a clearing house and advisory council to service the interests of the nation's 3,000 odd counties.

Mud Mountain Dam Bid Invitation Expected

According to an announcement recently made by Col. H. J. Wild, district engineer, Corps of Engineers, Seattle, bid call for the construction of the $4,000,000 Mud Mountain Dam may be expected early this month.

The structure, more recently designated Stevens Dam, located on the White River in southwestern Washington, will consist of a rolled earthfill section containing about 3,000,000 cu. yd. The existing design provides for a concrete spillway section, and a 2,000-ft. outlet tunnel with penstocks and valves. The project will require a four-year construction period.

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One simple demonstration will convince the most skeptical prospect that our cost cutting claims are sound . . . that the Brooks Load-Lugger is America's most effective . . . most versatile equipment for hauling and dumping any material, where loading is done by hand. When one Load-Lugger and four to eight Load-Lugger Buckets can replace several trucks, that's cost-cutting! Savings in operating cost alone pay for the Load-Lugger quickly. Write for "The Complete Load-Lugger Story" now.

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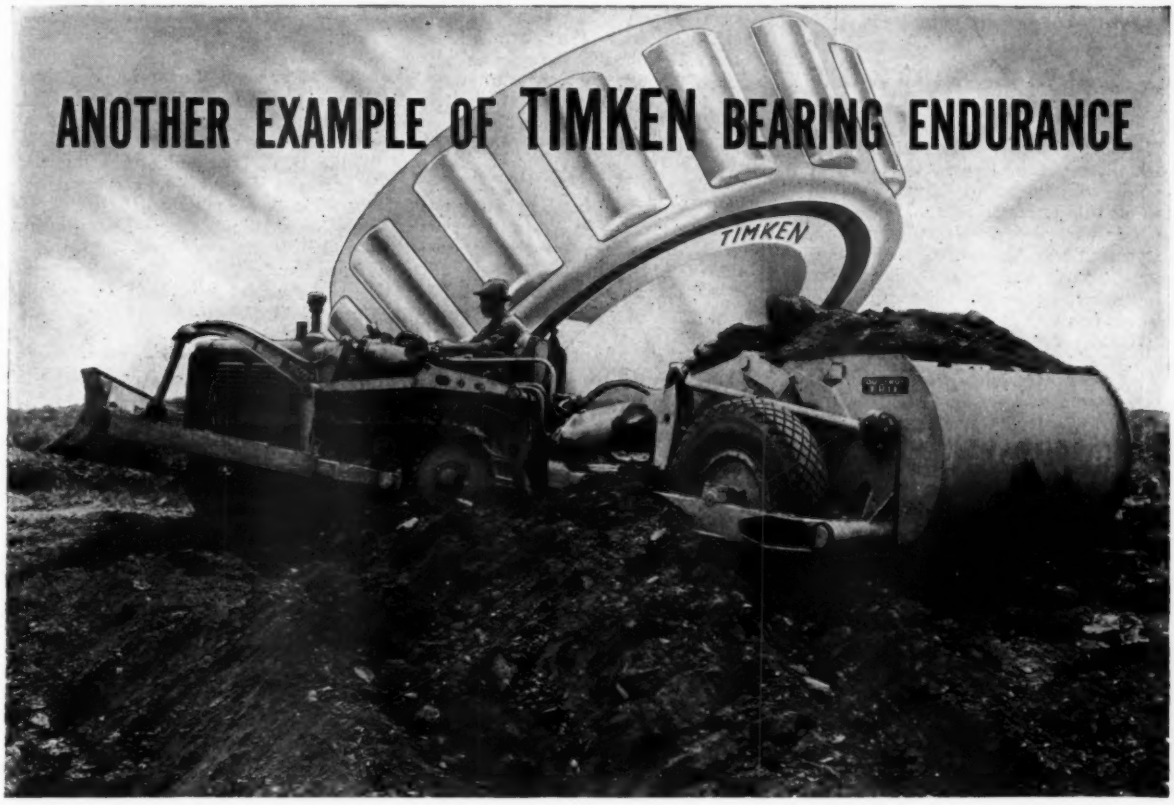
ANOTHER EXAMPLE OF TIMKEN BEARING ENDURANCE



Bucyrus-Erie Scraper equipped with TIMKEN Bearings in the wheels.

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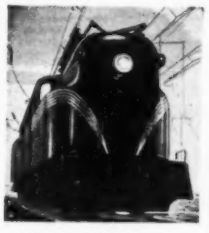
A symbol of quality for any piece of equipment with which it is associated



The Pennsylvania's new Broadway Limited rolls on TIMKEN Bearings.
GLIDE—as you ride a Timken Bearing Equipped train

Dirt moving is one of the construction industry's most important and toughest jobs.

Helping to do this job quickly, dependably and economically you'll find TIMKEN Tapered Roller Bearings in all kinds of equipment—power shovels, draglines, scrapers, wagons, tractors and graders.

TIMKEN Bearings make rough going smooth, heavy loads light. They hold moving parts in correct and constant alignment, prevent wear, simplify lubrication and save lubricant. Equipment lasts longer and costs less for maintenance.

You can have the same enduring service in your new machines by making sure they are equipped with *genuine* TIMKEN Bearings.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN
TAPERED ROLLER BEARINGS

For your convenience in writing to The Timken Roller Bearing Company, you will find a card bound in this issue.

Trade notes

Hercules Powder Company's New York Office will be located at 500 Fifth Avenue, effective about May 1, 1939. In making this announcement, W. M. Annette, in charge of the New York office, stated that Rex St. Claire will be manager of explosives sales. G. C. O'Brien will continue as manager of naval stores sales and as supervisor of general office activities.

A. J. Wadhams, Vice-President of the International Nickel Company, Inc., and manager of the Development and Research Division, has announced the establishment of a new field office located at 67 Wall Street, New York, New York. The new office, which was opened May 1st, is under the direction of J. W. Sands. Its main function will be to promote the use of nickel alloy steels and stimulate interest in products of the Huntington Mill, nickel cast irons and the use of nickel in non-ferrous alloys.

Secretary of Commerce Harry L. Hopkins announced a new business service would be available for distribution this summer in the form of an industrial market survey covering vital information of interest to business men in every country of the United States. The study, known as the Industrial Market Data Handbook, was originally requested of the Department of Commerce by the National Industrial Advertisers Association. The 1,000-page manuscript is expected to be off the presses by July 1.

The Harnischfeger Corporation of Milwaukee announces the appointment of W. G. Dixon and Associates located at 1218 Olive Street, St. Louis, Missouri, as the new agent for all P&H excavators, cranes, hoists, welders and electrodes. W. G. Dixon and Associates take over the contract formerly held by O. D. Hicks & Co. and their capacity is effective immediately.

At the annual meeting of the Board of Directors of The Cleveland Tractor Company held in Cleveland on April 19, H. P. Mee was elected Executive Vice President. Mr. Mee, after two years of retirement from the tractor industry, with which he had been associated for twenty years, returns to active duty with The Cleveland Tractor Company, In 1936 and 1937 he served as Vice President in charge of sales, service and advertising of Caterpillar Tractor Company. Prior to 1934, he was the Vice President and Treasurer of Caterpillar Tractor Company from the time of its formation early in 1925, and prior to that he was associated with the C. L. Best Tractor Company, one of the predecessors of Caterpillar Tractor Company.

The Ransome Concrete Machinery Company, General Offices and Plant, Dunellen, New Jersey, have just announced the appointment of: Earl Walker Co., Inc., Sullivan, Illinois, to handle the line of Small Mixers sizes 3½-S to 14-S inclusive, in the nearby counties in Illinois surrounding Sullivan —and O. B. Kramp, Coral Gables, Florida, to handle their complete line in the nearby counties in Florida surrounding Coral Gables.

Costs Reduced
. . . ON TOUGH EXCAVATING JOBS

A 1½ cu. yd. Sauerman Slackline Cableway lifts 40,000 cu. yd. of rock from river in a few months' time.

Sauerman Tower Excavator shown above offers large capacity in loading materials from pit or storage pile into cars or other conveyance.

ON work where materials have to be moved distances of one hundred feet or more, a Sauerman machine cuts costs by being able to dig, haul and place the material in a continuous, straightline operation, doing away with the expense of rehandling,

Further points in favor of a Sauerman machine are its reasonable first cost, its one-man operation and its freedom from maintenance troubles.

Typical examples of pit and bank excavation, alluvial mining, moving blasted ore, deep dredging, stockpiling and reclaiming, etc., are illustrated in the Sauerman catalog. Write for your free copy of this useful book.

SAUERMAN BROS., Inc.

474 S. CLINTON ST. CHICAGO

OBITUARIES

James Munn

James Munn, former general superintendent of construction for the Metropolitan Water District, died suddenly at his home in San Francisco, California, on April 28. He was 74 years old.

Mr. Munn, born in Scotland, came to America in his early youth to enter the construction industry. He joined the United States Reclamation Service in 1909 and remained there until 1924.

Soon after, he was placed in charge of construction of the Mokelumne water supply project of the East Bay Utility District, Oakland.

In 1930 he became associated with the Metropolitan Water District and until his retirement last year was general superintendent of construction of the 400-mile Metropolitan Aqueduct. He rose to national prominence for his work on this project.

Mr. Munn is survived by a son, William B. Munn, of Oakland, California, and by two brothers.

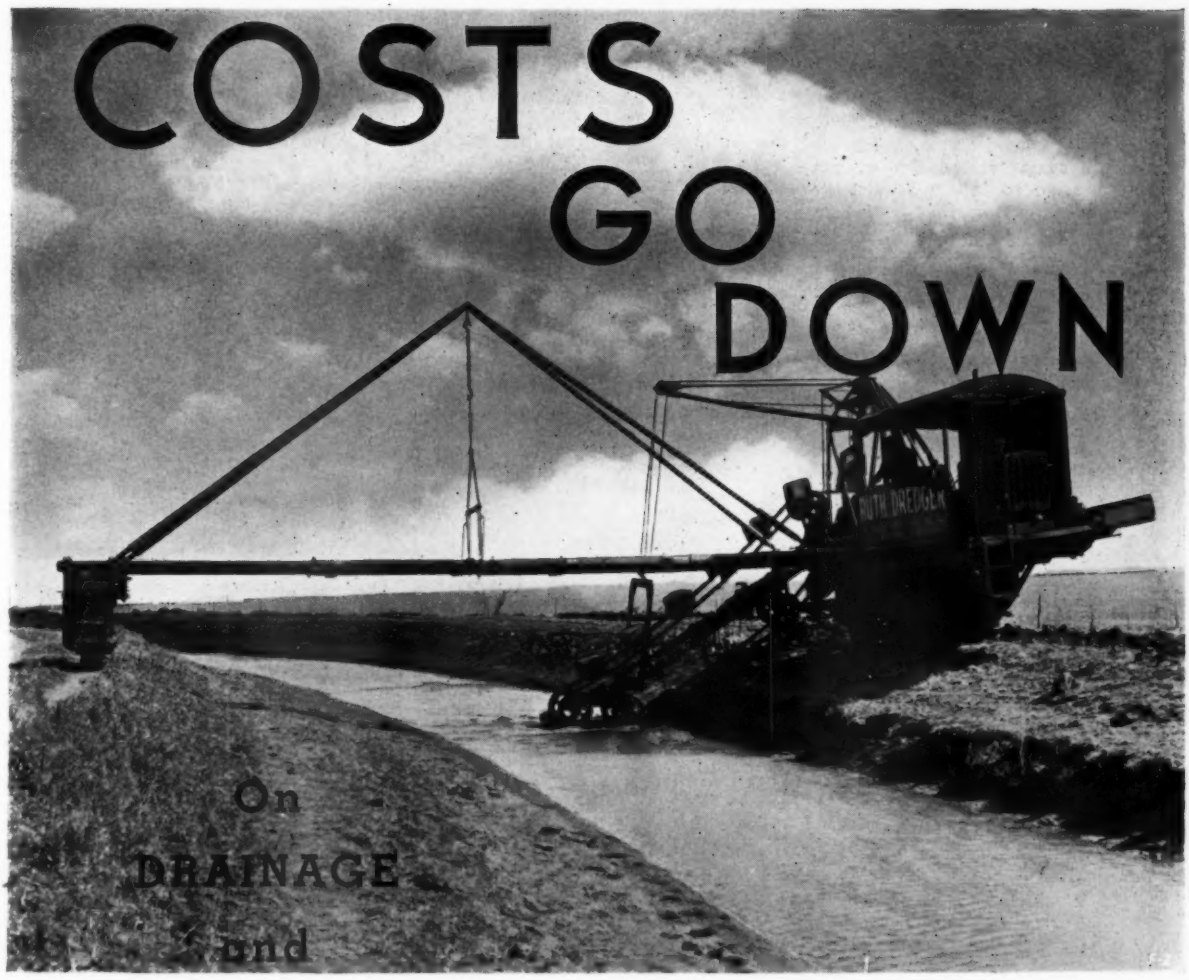
Quincy A. Campbell

Quincy A. Campbell, 47, assistant chief engineer of the National Paving Brick Association, Washington, D. C., died at Cleveland, Ohio, April 19. He was buried at Bellefontaine, Ohio.

Mr. Campbell was graduated from the Ohio State University in 1920 with the degree of Bachelor of Civil Engineering. During the World War, he served as instructor in the aviation ground school at the university and at Kelly Field, Texas. After spending a year in engineering work in the Republic of Santo Domingo, he joined the Ohio department of highways in 1921 as assistant engineer. During the following seven years he served the department as assistant division engineer at Ravenna and as assistant chief engineer of maintenance, with headquarters at Columbus. In July, 1928, he resigned from the Ohio department to accept the position with the National Paving Brick Association which he held at the time of his death.

For your convenience in writing to Sauerman Bros., Inc., you will find a card bound in this issue.

COSTS GO DOWN



IRRIGATION with the BUCYRUS-RUTH EXCAVATOR

1. Builds and cleans ditches to depths, widths and slopes required by your project because its operating range is extremely flexible. Works on top of narrow banks.
2. Cleans ditches without interrupting water service.
3. Handles all materials normally found in irrigation and drainage ditches.
4. Operates easily over soft ground because its long, wide tracks give low ground pressure. Because it moves while digging, it has little chance to bog down.
5. Gets big output because it operates at full capacity all the time, digging as it moves.

BUCYRUS ERIE

Write for illustrated bulletin BR-1 which gives full details of Bucyrus-Ruth performance.

Bucyrus·Erie

SOUTH MILWAUKEE, WISCONSIN

For your convenience in writing to Bucyrus-Erie Company, you will find a card bound in this issue.

Book reviews

A survey of typical types of highway bridges in the United States, which are built of pressure treated timber, has just been compiled into a booklet by The Wood Preserving Corporation, a Koppers Company subsidiary, Pittsburgh, Pennsylvania. Engineering data, photographs, records of service life and maintenance, as well as savings in construction, are included in the publication. Bridges selected for the survey embrace various types which have been built under a variety of conditions.

Displaying 41 photographs which illustrate the many features of the new and improved Bucyrus-Erie 37-B shovel, dragline, clamshell, crane and dragshovel, a 32-page bulletin, released by Bucyrus-Erie, tells the whole story of the machine construction from the dipper teeth to the cats. Copies can be had by writing direct to South Milwaukee.

The Tenth Edition of Machinery's Handbook has just been published by the Industrial Press of New York.

Since the first edition of this publication in 1914, the book has continually increased in popularity and is now used extensively as a work of reference where machine or other mechanical products are manufactured. The Handbook is revised as frequently as is practicable for a voluminous work which must necessarily be printed in large editions to meet the constant demand for it.

This tenth edition contains 585 pages of new and revised matter not found in editions earlier than the Sixth, and 447 new pages not in editions earlier than the Ninth. To provide space for all this the Tenth edition has been increased to 1816—an increase of 224 pages over the Ninth Edition. This new material covers a large variety of subjects that are important to designers and builders of everything mechanical. Recent or revised engineering standards are included, together with a large amount of general information and mechanical data representing the latest designing and manufacturing practice.

"Caterpillar" Diesel Tractors, Engines and Road Machinery, on a variety of jobs in more than a dozen different countries, are the subjects of a new 4-page book, issued by Caterpillar Tractor Company. Copies of the booklet may be obtained by writing Caterpillar Tractor Company, and requesting "Many Jobs in Many Lands."

The Chain Belt Company, Milwaukee, Wisconsin, announces a number of new catalogs. Outstanding among these is the new Rex Moto-Mixer catalog No. 340 which explains in detail the mechanics and operation of the new 1939 Moto-Mixer. The group include catalog Nos. 340, 341, 342, 343, and 344 which are descriptive of the Rex 5½-S Mixer, the Rex 5-S Mixer, 7-S Mixer, 10-S Mixer, 14-S Mixer, the complete line of Moto-Mixers and the Rex 27-E Pavemaster. Copies of the bulletin or bulletins you are interested in will be sent on request.

Macwhyte Company, Kenosha, Wisconsin, has just published an easy-to-read, single page bulletin on "Why Corrosion Shortens The Life Of Wire Rope." In a simplified 1-2-3 order it tells briefly when, where, and how corrosion strikes . . . and how to prevent it. Copies of the bulletin may be obtained by writing directly to Macwhyte Company, Kenosha, Wisconsin.

LeTourneau METHODS, a bi-monthly publication, has recently been introduced by R. G. LeTourneau, Inc., of Peoria, Illinois. In it means of handling varied jobs in the fields of construction, lumbering, mining, and kindred industries are explained, and illustrated. The March-April issue may now be obtained at "Caterpillar" and LeTourneau dealers or by writing R. G. LeTourneau, Inc., Peoria, Illinois.

The Ingersoll-Rand Company has just issued a two-color four-page bulletin describing its line of rock-drill-steel sharpeners and oil furnaces. This equipment is designed for use in mines, quar-

(*Continued on page 366*)

Drilling and Fishing Tools

By

BUCYRUS ERIE

Your drill is no better than its weakest part. For the best results you need time tested, dependable tools that ask no favors; tools that are designed to do a job effectively and made of steels that give long service. Bucyrus-Erie tools have proved through years of service that they meet these requirements. Send for Tool Catalog and Price List today. And the next time you need drilling and fishing tools—try Bucyrus-Erie Service. Stocks are kept on hand at convenient warehouses in South Milwaukee, Wis.; Evansville, Ind.; Erie, Pa.; Englewood, N. J.; and Waterloo, Iowa, for your convenience.

BUCYRUS-ERIE

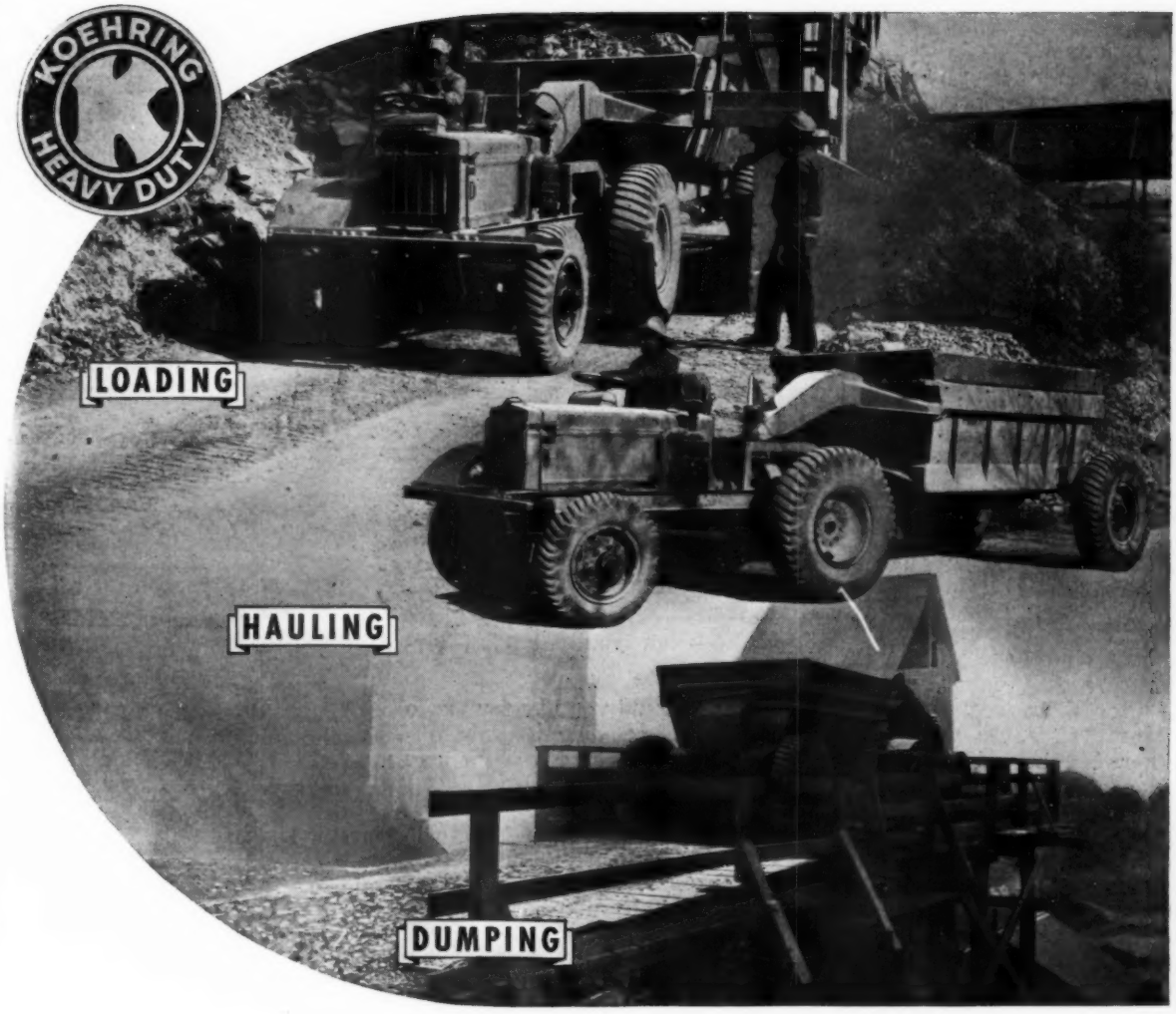
SOUTH MILWAUKEE, WISCONSIN, U.S.A.

Excavating, Drilling, and Material Handling Equipment

H-5

For your convenience in writing to Bucyrus-Erie Company, you will find a card bound in this issue.

KOEHRING



Quarry Hauling Costs Are Reduced!

Three Trail-Dumps replaced five to six other units in this quarry transportation problem. Ten tons for every load, high speed travel from primary to secondary crusher and instantaneous dumping at the second crusher, reduced hauling time, increased capacity for each trip, and reduced dumping time. Lower investment, lower maintenance, increased production, are three important factors responsible for substantial reduction in hauling costs on this job.

KOEHRING COMPANY, ***Milwaukee, Wis.***

HEAVY-DUTY CONSTRUCTION EQUIPMENT

For your convenience in writing to Koehring Company, you will find a card bound in this issue.

NOT in the *Contract*

A traveling salesman received this telegram: "Twins arrived tonight—more by mail." The salesman immediately wired back: "Overjoyed r e g a r d i n g twins (stop). If more arrive by mail refuse them."

Doctor: "The best exercise for your wind is skipping rope."
Contractor: "Doc, I refuse to give up cigars!"

An aunt said to her niece, "Don't you think we ought to pull our shade down, or has that fellow across the way a nice face?" And the niece answered, "I don't know. I've never seen it without binoculars in front of it."

"Last night, I questioned my husband for hours about where he'd been."
"What did you finally get out of him?"
"A fur coat."

Most shovel operators say they favor "a well-rounded personality" for their ideal girl, but we suspect if she's well rounded otherwise, they will not object too strenuously.

Mrs. Jones—Two of my daughters are working girls.
Mrs. Smith—Huh! Two of mine are working men.

"The star of this floor show is S a l l e y Shapely, an eccentric dancer."
"An eccentric dancer? What does she do?"
"She dances with her clothes on!"

Nan—Now that I'm married, I'm going back to work.
Ann—To get some pin money?
Nan—No, dearie, some safety-pin money!

The tourist had stopped to change tires. "I suppose," he remarked to a native onlooker, "that in these isolated parts the necessities of life come pretty high."
"Y'er right, stranger," replied the native, gloomily, "an it ain't worth drinkin', when ye get it!"

He—And, Baby, after we're married, we'll get ready for the stork.
She—Now you're talking turkey.

"How would you like for me to meet you in your dreams, tonight?" asked the girl of the boy. And the boy said, "Half-way!"

"Darling, as I kissed you then, love was born."
"That's fine, dear, but wipe that birthmark off your lips."

"All right, Wilburforce, cut out your funny stuff!"

Marcellus: Yo' done said yo' could lick me?
Jasper: Uhmum, I sho' did, big boy. Want to see me demonstrate?
Mercellus: No, indeedy; I'se jest gatherin' statistics.

"That man has made a fortune getting around pretty girls."
"I'll bet he's a gigolo."
"No, dearie, he's a girdle manufacturer."

"Nobody will be the wiser if I kiss you."
"Then don't kiss me. I'm after an education."

Ballerina—This new dance of mine is going to wow the audience.
Dancer — Aren't you worried about the flimsy costume slipping off?
Ballerina—Of course not! I'm almost positive it will.

"My brother looks down on nudists."
"You don't say so."
"Yeh, he perches in trees."

Judge: "Don't you think you and your husband, Rastus, could live together without fighting?"
Mandy: "No, yer honor; dat is not happily."

John—Gee, until now I never realized that Sue has a mighty pretty leg.
Nick—Oh, I've felt that all along.

"Yessir, as soon as we married my wife fired my secretary."
"Why, I thought she used to be a secretary herself."
"Yes, that's why she fired her."

Contractor: "Not a day passes but what my wife shows her incompatibility."
Superintendent: "Ain't it a crime the way women dress?"

If a girl expects to win a husband, she ought to exhibit a generous nature—or else how generous nature has been to her.

First Lunatic — It's certainly boresome and monotonous in this place, isn't it?
Second Asylum Inmate—Yes, if I stay here another day, I'll go crazy!

• Framed in the drawing above is an actual photograph taken on a road contract in West Virginia, and the broken rock in sight is a part of that blasted from drilled holes put in by one Cleveland Drill Rig in two weeks overall time. Holes were drilled 20 feet deep. The rock consisted of strata of sandstone, clay, shale, and limestone, not the easiest drilling in the world, but the holes were put down at a rate of more than 1000 feet per day. The Cleveland's exceptional blowing power, plus the effective means for withdrawing drill steels from the holes, made the job easy sailing all the way through this cut.

Cleveland Drill Rigs will show you something on your job too. Demonstration any time, on your own ground, with your own operator. Ask us to send Bulletin 31.

APPROVED
N. Y. STATE
B. S. A. 2339

We make a complete line of Hand Sinkers, Drifters, Stopers, Wagon Drills, Paving Breakers, Clay Diggers, Tampers and Accessories.

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THE CLEVELAND ROCK DRILL COMPANY

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Cable Address: ROCKDRILL

LEADERS IN DRILLING EQUIPMENT

For your convenience in writing to The Cleveland Rock Drill Company, you will find a card bound in this issue.

20 Years of Progress . . .

(Continued from page 320)

more efficient. Increased yardage moved per mile and larger hauling units, which now became available, made a demand on shovels of 1 cu. yd. and 1½ cu. yd. capacity.

Between the years 1924 and 1928 there was considerable competition among various types of power—steam, gasoline, gas-air, gas-electric and diesel. While diesel engines had been successful in stationary work under uniform loads, they encountered some difficulty in metering the fuel supply under the varying load demands of power shovel work. The early engines had many adjustments and had the reputation of being complicated. They did not meet with general approval in spite of their fuel economy. By the end of this period, steam power was practically eliminated from new shovels and the straight gasoline driven unit emerged as the leader.

Improvements in air compressors, particularly in their portability, and developments in air tools resulted in the elimination of a considerable amount of hand drilling.

For haulage, the introduction of light dump-trucks of 1½ and 2-ton capacity mounted on pneumatic tires, replaced horses and mules, in a great many cases. When equipped with dual rear tires, these trucks were capable of operating over ground that would have stopped heavier trucks on solid tires which were tried in the previous period. The shorter wheelbase of smaller trucks and improved steering mechanics made them more maneuverable and better spring suspension allowed greater return speed on rough ground.

It was about 1927 that wagon manufacturers met the demand for larger units with a bottom dump tractor-drawn wagon of 7 to 8 cu. yds. capacity mounted on tracks. Such tracks had been used in agriculture and in logging for a number of years. The first of these bottom dump wagons had wheels in front, but because of the difficulty of applying a braking action to the tracks in the rear they were hard to control when going down steep grades. This was corrected by the introduction of the cart-type or semi-trailer type of tractor trailers toward the end of this period. Such trailers were often operated in tandem behind a 60 h.p. tractor.

By this time Blade Graders were being made stronger and heavier than before. Refinements in design and construction, such as enclosed machine cut gears, anti-friction bearings and hand controls reduced wear and made their operation easier than the earlier models. Their capacity was also increased.

During this period, the development of the power take-off for tractors provided for powering or operating equipment used with them. One of the first was the Elevating Grader. Driving the belt by power taken from the power take-off of the tractor increased the grader's efficiency. With 60 h.p. tractors (the largest available in this period) it was satisfactory to operate up to 42-inch belts in this manner.

Development of Rotary Scraper

Another tool developed for use with tractors was the rotary scraper, so called because the bowl revolved a quarter turn from carrying position to spreading position and then rolled over to complete the circle in returning to cutting and loading position. The tractor operator controlled these movements by means of a rope attached to a lever on the scraper. In transporting, part of the load was carried within the bowl and part was pushed ahead, the same as with the horse-drawn Fresnos.

Under fairly good conditions, a rotary scraper behind a 30 to 35 H.P. tractor would produce at the following rates:

Length of Loaded Haul in Feet	Cu. Yds. Per Hour Compacted Measure
50	38
100	29
150	24
200	20
250	17
300	15

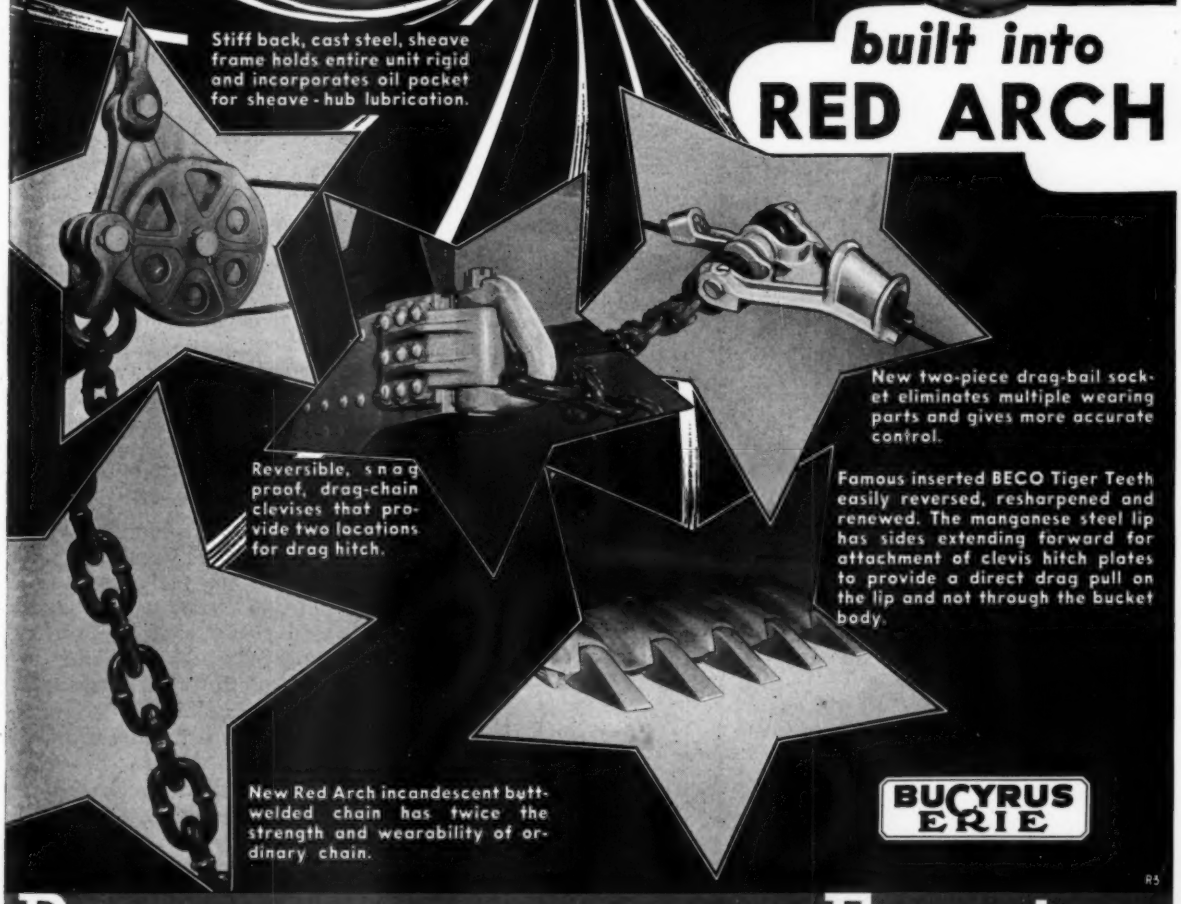
For longer hauls, wheel scrapers continued in use for tractor operation. They were of larger size and different design than those of the previous period. The 1½ yd. scraper was most generally used, and three were drawn behind a 60 H.P. tractor. As with horse-drawn wheelers, one man was used in the pit as a loader

• **Left: An Allis-Chalmers combination made up of a road grader and a diesel tractor cuts a ditch near Montgomery, Alabama. Right: An early type motor grader, controls were manually operated.**

WORLD WIDE EXPERIENCE

built into RED ARCH

Stiff back, cast steel, sheave frame holds entire unit rigid and incorporates oil pocket for sheave-hub lubrication.



New two-piece drag-bail socket eliminates multiple wearing parts and gives more accurate control.

Reversible, snag proof, drag-chain clevises that provide two locations for drag hitch.

Famous inserted BECO Tiger Teeth easily reversed, resharpened and renewed. The manganese steel lip has sides extending forward for attachment of clevis hitch plates to provide a direct drag pull on the lip and not through the bucket body.

New Red Arch incandescent butt-welded chain has twice the strength and wearability of ordinary chain.

BUCYRUS ERIE

R3

Bucyrus-Erie

SOUTH MILWAUKEE, WISCONSIN

For your convenience in writing to Bucyrus-Erie Company, you will find a card bound in this issue.

and one dump man was kept on the fill.

Under ordinary conditions a string of three 1½ cu. yd. scrapers would produce at the following rate:

Length of Loaded Haul in Feet	Cu. Yds. Per Hour Compacted Measure
200	42.0
300	36.0
400	31.0
500	27.3
600	24.5
700	22.4

Bulldozer Introduced

The now indispensable bulldozer is another piece of equipment that can be credited to this era (1924 to 1928) although it did not reach that stage of perfection which made it universally used until a later period. The idea had its inception many years before when animal power and the old Mormon board was used to spread earth. In tracing its history, it is difficult to separate fact from fiction. One story is that the Mormon board worked all right as long as the team could be kept in front and the material pulled into place, but it was not satisfactory when material had to be pushed over a bank. It was on such a job that someone conceived the idea of mounting the board on the front end of a pole between a yoke of oxen—hence the name of "bulldozer."

It appeared in another form when the push board and pole were on wheels like the tongue and front running gear of a wagon. Runners on the back of the board kept it from digging too deep when crowding and furnished support when backing. Controlling these devices was difficult and the bulldozer did not come into general use until the adoption of tractor power. The first tractor-mounted bulldozers were hand operated and difficult to handle but before the end of this period, the introduction of hydraulic and mechanical devices for raising and lowering the blade made them more useful.

A modification of the bulldozer with the blade mounted at an angle was developed for back-filling trenches. The tractor and back-filler is operated parallel to the trench and the angle of the blade provided lateral displacement of the loose earth thus eliminating much backing of the tractor.

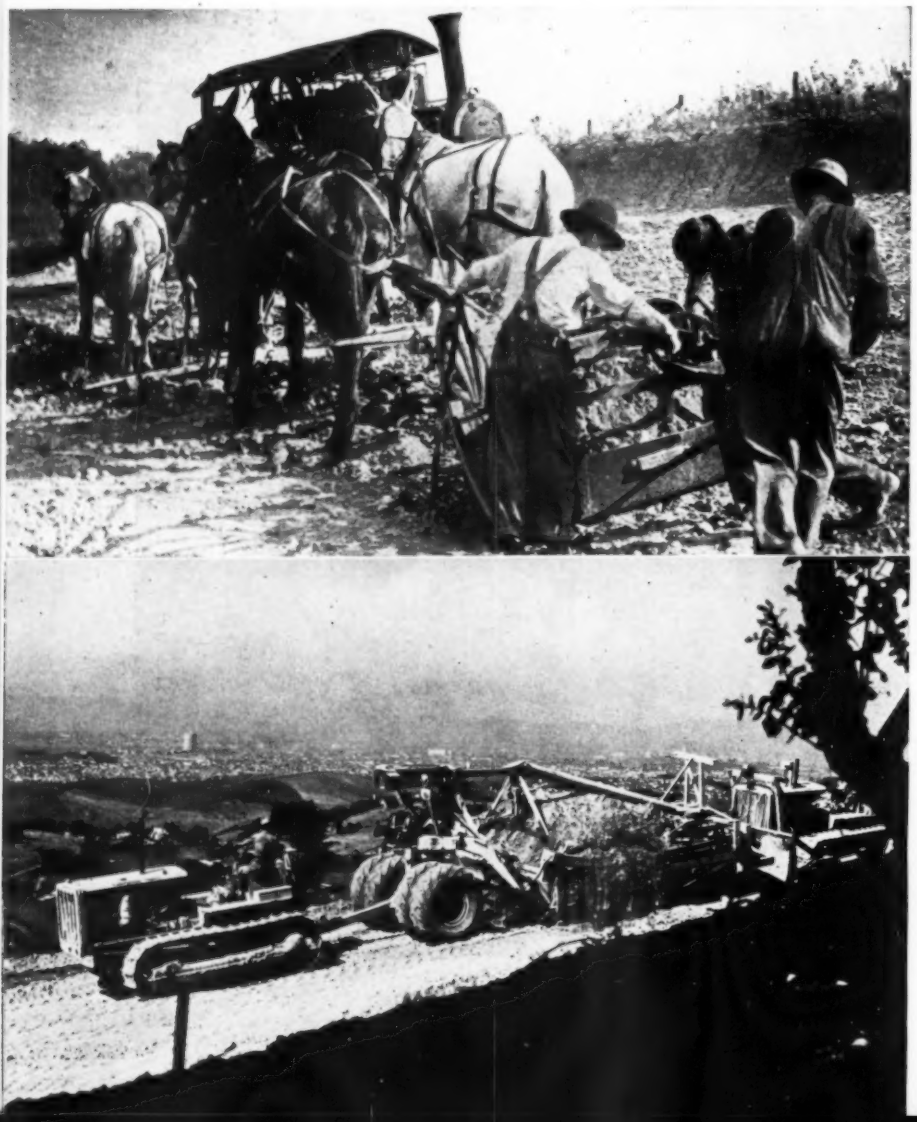
Introduction of Diesel Power

The first part of this period was marked by an increase in power and capacity of construction equipment. The latter part witnessed the introduction of diesel power.

Improvements in metals and the introduction of welded construction began to have its effect on the design of earth-moving machinery. Greater strength and rigidity were thus obtained with less weight.

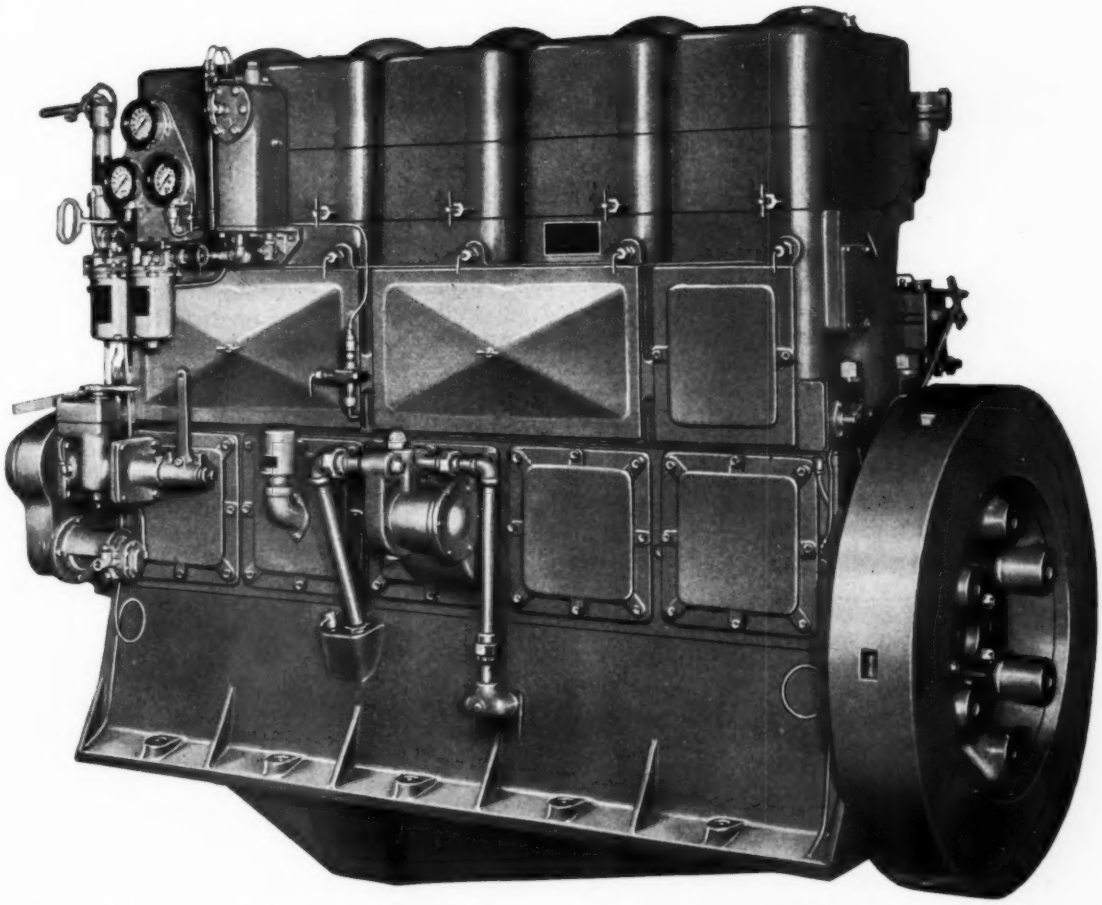
Power shovels were now offered for highway use in sizes ranging from ½ cu. yd. to 2½ cu. yd. dipper capacity and the smaller sizes were speeded up. Refinements in design improved the operating characteristics and reduced the cost of upkeep. Marked increase in the output of shovels of a capacity up to 1¼ cu. yds. was noticed.

By this time a greater range in truck sizes was found on highway grading work. While some as large as 10-ton capacity were used on heavy work, the usual sizes ranged from 1½ ton to 5 ton. The increase in size of trucks was desirable on account of the increased yardage of earth moved per mile of road built and the increased capacity of the loading units. The feasibility of the larger units was, to a great extent, due to improvements in pneumatic tire construction which provided greater carrying capacity and increased life. Also about this time there appeared a type of truck



• **Top: Five horses were the motive power for this wheeled scraper used in 1914. A steam roller is in the background. Bottom: With San Francisco as a background this modern dirt moving combination presents a striking picture as it grades a scenic boulevard.**

A DIVIDEND PAYING *Investment*



Here is the Diesel that contractors have depended upon for years—depended on for heavy duty service and for dividends.

Atlas Diesels of the heavy duty, fully enclosed type, have been used in excavators, draglines and dredges for over ten years. They have the high torque characteristics which permits Atlas powered equipment to keep going when the going gets tough. They present such a low overall operating cost that maximum yardage is moved in jig time and at minimum cost.

If you want dividends from your investment, power your equipment with Diesels that have proven that they can take a beating without pampering; Diesels that will keep on swinging when others are down for repair; engines whose operating and maintenance costs are so low that when coupled with high performance, you make a profit on every job.

Four sizes are available—4, 5, 6 and 8 cylinders—all of 9" bore and 10½" stroke—practically all working parts are interchangeable. Write for free bulletin.

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ATLAS *Imperial* DIESEL ENGINES

For your convenience in writing to the Atlas Imperial Diesel Engine Co., you will find a card bound in this issue.

designed especially for earth moving, featuring heavier frames, transmissions and rear axles than were common on standard trucks of the same rated capacity used for cross-country haulage. A shorter wheelbase and a more uniform distribution of weight was provided by mounting the engine with an over-hang beyond the front axle. This design allowed shorter turning and greater maneuverability on the fills.

Improvements in trucks and the development of larger tractor-drawn semi-trailer track-type wagons, eliminated horses and mules from hauling earth in road construction. Tractor-wagons of larger capacity and of bottom, side and rear dump types were made feasible by the development of larger tractors having 65 to 75 H.P. at the drawbar and the improvement in track construction.

Though the increased horsepower of tractors called for heavier and stronger blade graders, the outstanding development in the grader line was the motor grader designed and constructed as a unit. Prior to this time, motor graders had been built as attachments for either wheel or track-type tractors. As such, they were only maintenance machines, with little use in construction work and have not been previously mentioned in this discussion.

The new machines, with all movements of blade, circle and scarifier power controlled, found use in preparing subgrades and in maintaining construction roads for truck hauling.

Led to Power Controls

The introduction of this type of motor grader is of particular significance because it pointed the way toward mounting engines on blade graders and elevating graders and operating them by means of power controls.

Probably the most outstanding development during the period from 1929-1933 was the adaptation of diesel power to tractor use. This was the result of a long period of research and development. At first only the largest track-type tractors were powered with diesel engines, but later they were adopted for all sizes. The economy in operation of the diesel engine was quickly recognized.

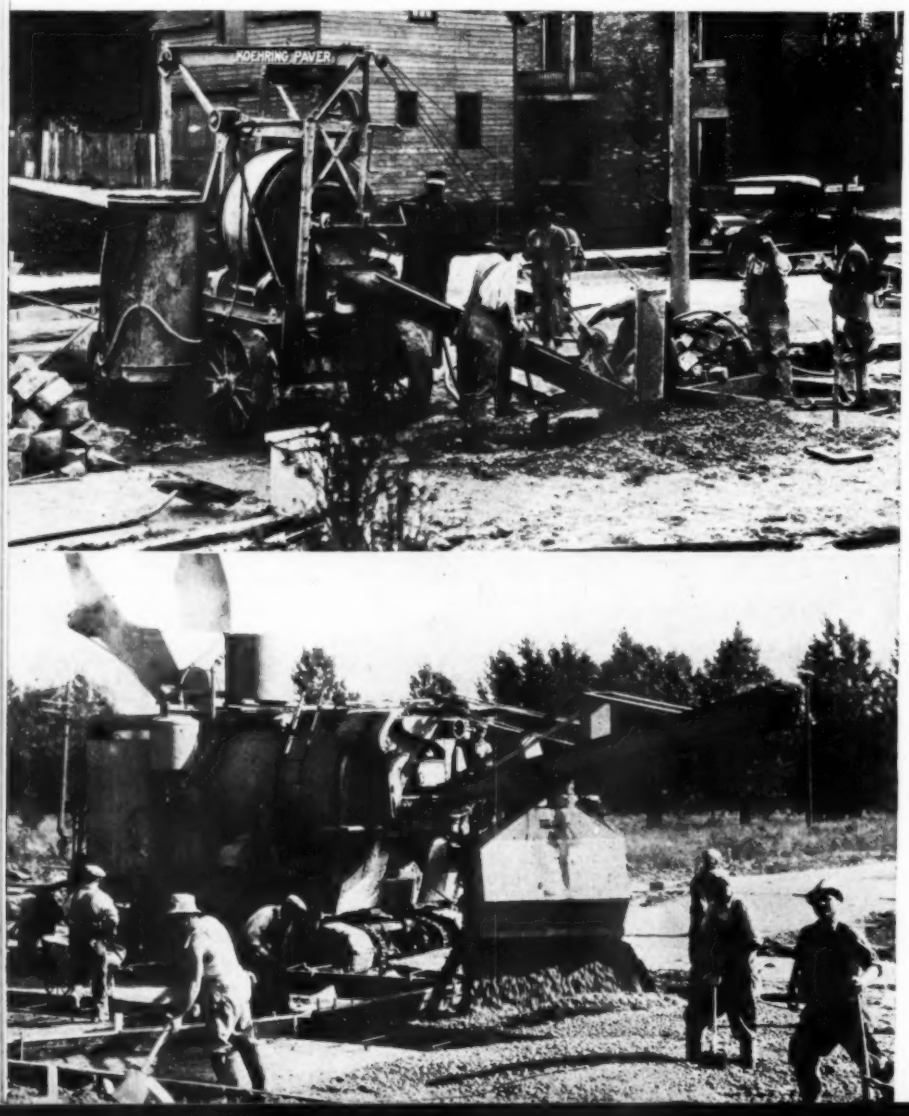
The saving of from 70 to 75% of fuel cost was a large factor in extending the application of diesel engines to power shovels, draglines, trucks, air compressors and auxiliary power units. The adoption of diesel engines in these fields, however, did not come until the next period. There was, from 1929 to 1933 an increase in the application of power to operate auxiliary equipment by power from the power take-off. This led to improvements in mechanical and hydraulic power units mounted on the tractor with the controls within reach of the tractor operator.

The increase in the size and power of tractors also resulted in the development of larger scrapers. The wheel scrapers of the previous period were modified and enlarged. Under fairly good operating conditions a 75 H.P. tractor could handle four such scrapers rated at 2 cu. yds each. The output under such conditions would be as follows:

Length of Loaded Haul in Feet	Cu. Yds. Per Hour Compacted Measure
200	66
300	56
400	50
500	45
600	40
700	37
800	34
900	31
1000	29

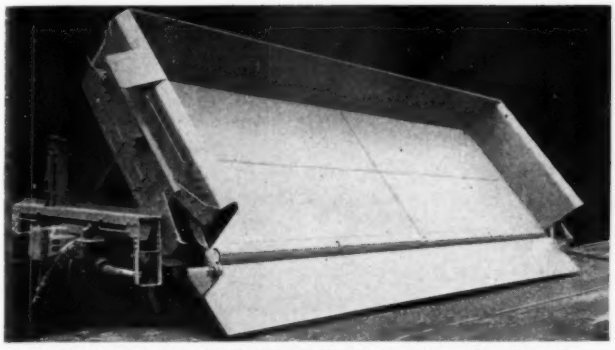
At this time, hydraulic controlled bottomless scrapers were adopted in highway construction. They had previously been used in land leveling operations from which they got the name of land-leveler type.

With these machines, a fine

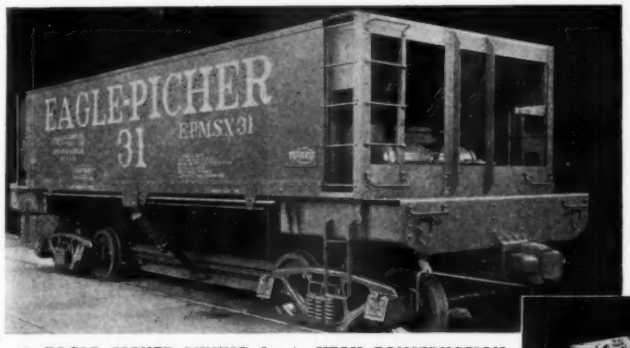


• Top: Wheel mounted Koehring paver making a driveway in 1921. Bottom: A modern Koehring paves a street. Note increased capacity and cat-mounting.

★ FORT PECK TUNNEL CAR: Maximum capacity within limited dimensions . . . combines in its design and construction the best ideas of expert tunnel builders and car engineers. Featuring all-steel construction, compression lock, and roller bearing trucks. This popular car has proved its reliability and low cost operation on numerous large tunnel projects.



★ UTAH COPPER CO., DROP-DOOR CAR: In general use throughout the West in open pit mines. Also used by many railroads for re-location work, maintenance and construction . . . and for building dams, jetties and breakwaters, hauling rip-rap and aggregate. This heavy duty, 30-yd., 70-ton drop door, side pivot air dump car . . . made of light weight alloy steel with high copper content . . . pays big dividends on its cost wherever it is necessary to move larger amounts of material.



★ EAGLE-PICHER MINING & SMELTING CO., HOPPER CARS: These 58-yd. level full, 70-ton air operated, hopper bottom dump cars handle same tonnage in 1½ hours that formerly required four hours. Built to withstand terrific impact of raw zinc and lead ore dropped 10 feet from overhead chutes. May be built in any size for both narrow and standard gauge track.

★ UTAH CONSTRUCTION CO., 30-YD. LIFT DOOR CAR: 12-yd.; 20-yd.; and 30-yd. cars of this type are in stock, available for immediate delivery; also obtainable on a rental basis with attractive purchase option.

When DIRT MUST MOVE *Dirt Cheap*

"WESTERN" *specify* Custom-Built Cars *and* HAULAGE EQUIPMENT

● For more than 60 years a heavy share of the world's on-and-off track dump cars have been engineered and built by WESTERN haulage equipment specialists. Today most of the great open pit mines of the United States are using WESTERN Cars. On the large tunnel jobs WESTERN Tunnel Cars predominate. And, WESTERN Custom-Built Haulage Units were selected for such world famous major projects as Boulder Dam, Metropolitan Water District of So. California Tunnels, Panama Canal, Welland Canal, Fort Peck Dam, Grand Coulee Dam, Twin Peak Tunnels, Baltimore Tunnels, N. Y. Barge Canal and Miami Conservancy, etc.

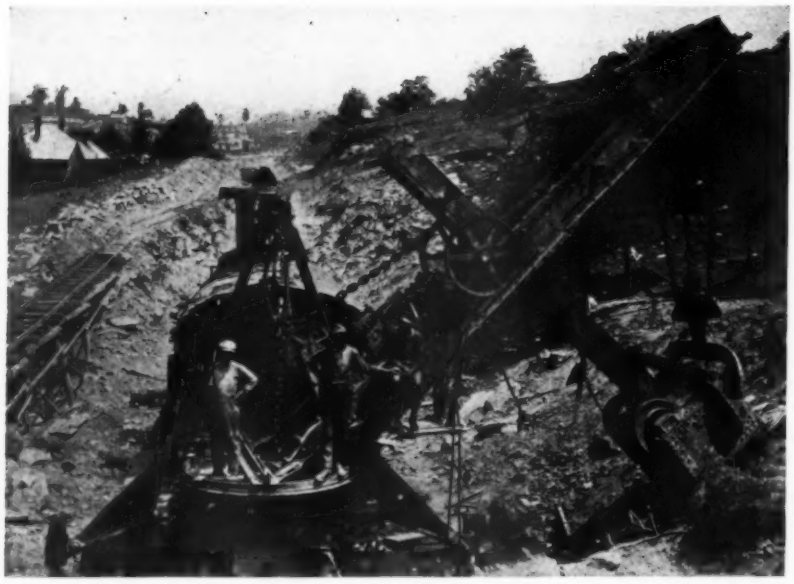
The units illustrated here . . . each custom-built for the most efficient and economical handling of a specific haulage job . . . reflect the practical value of WESTERN'S 60 years experience in designing hauling equipment that meets individual production problems.

Ask us to make recommendations on your rail or off-track haulage units. WESTERN Cars are designed to meet the individual requirements of your layout . . . to load and discharge maximum tonnage at top speed, and at rock bottom cost for operation and maintenance.

THE AUSTIN-WESTERN ROAD MACHINERY CO.
***Formerly* WESTERN WHEELED SCRAPER CO.**
Aurora, Illinois

· Austin-Western ·

For your convenience in writing to The Austin-Western Road Machinery Co., you will find a card bound in this issue.



• A Bucyrus 60-C railroad-type shovel making a cut through heavy rock at Coeburn, Virginia.

grade could be cut and material spread to any desired depth. Under ordinary operating conditions a bottomless scraper of 4 to 5 cu. yds. rated capacity behind a 75 H.P. tractor would produce the following output:

Length of Loaded Haul in Feet	Cu. Yds. Per Hour Compacted Measure
100	135
200	90
300	65
400	52
500	42
600	35

The use of larger hauling units during this period and the introduction of specification requirements calling for fills to be placed in layers created an increased demand for bulldozers. Improvement in hydraulic and mechanical controls made them much more efficient.

About the beginning of this period (1929-1933) the United States Forest Service was engaged in an enlarged program of building roads and trails into the forests for fire fighting purposes. Much of this work consisted of shelving out narrow benches or roadways along side hills. The Forest Service engineers conceived the idea of using a bulldozer or a backfiller for this work. The bulldozer did not provide lateral displacement and the angle of the backfiller blade was too acute because it was designed for use in loose earth. A modification of the two designs with added features that were required for this type of work resulted in the "trailbuilder." Improvements came rapidly and by the end of this period the trailbuilder reached a high state of development. Credit for originating the idea and for many of the improvements should be given to the U. S. Forest Service.

Era of Refinement in Design and Increased Capacity

The trend in construction equipment during the past five years has been toward full power operation with centralized and easier control. This became more necessary than ever before because of the increase that was demanded in capacity and speed of operation.

Developments in the manufacture of power shovels further increased the amount of earth they could handle. The sizes used on highway work ranged in size from ⅜ cu. yd. to 2½ cu. yd. The 2 yd. dipper is probably the maximum economical size for highway work at present and 1¼ cu. yd. is probably the most generally used. Improvements in design and construction provided easy conversion from power shovel to dragline or crane in the field.

Acceptance of Diesel Powered Shovels

This period marks the general acceptance of diesel power in shovel design. The simplicity in design and operation of diesel engines and their ability to meet rapid changes from no load to full load that won acceptance for them in the tractor field were brought into the shovel and dragline field. Their fuel economy and reliability added materially to reducing cost of shovel operation.

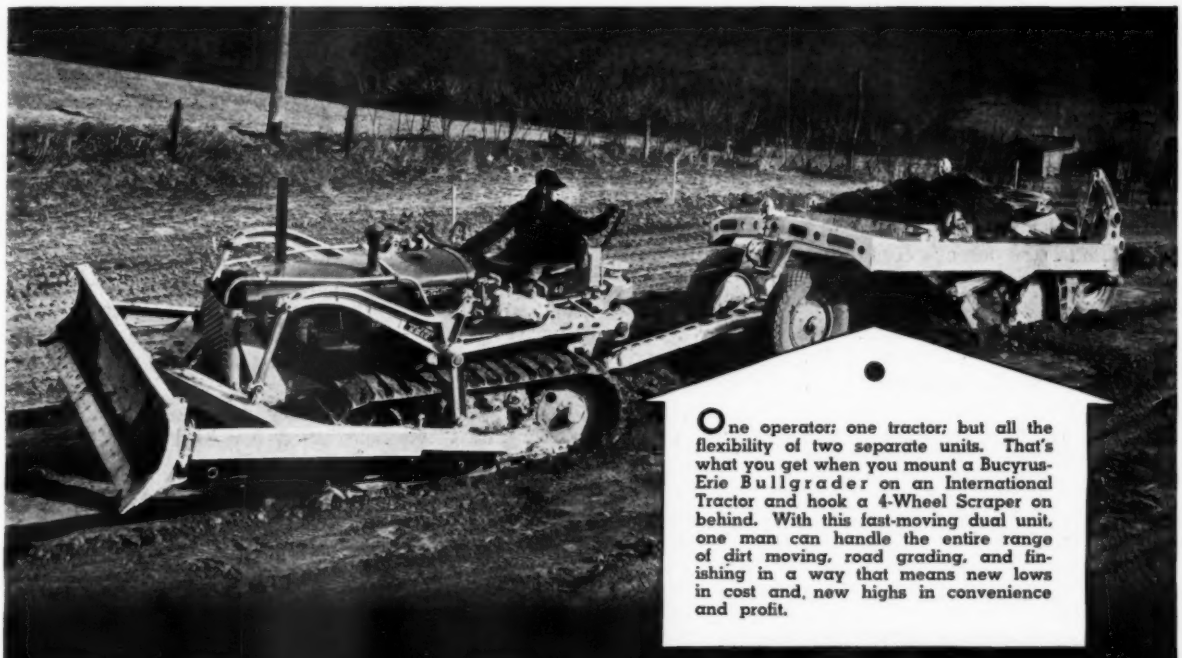
The development of portable air compressors included the adoption of diesel engines about the same time that they were adopted in power shovels. The present high speed two stage compressors have greater portability and greater efficiency and economy than previous models. The two-stage feature has an advantage in overcoming effects of altitude in supplying the air required in drilling. The change in standards of road construction requiring greater depths of cuts involved more rock work. Therefore, compressors and drills have become a more important factor in highway construction.

Trucks, in a wide range of sizes, were produced during this period. Tire manufacturers aided materially by developing special tires for construction hauls. These not only had greater load-carrying capacities but also offered more ground contact and therefore, did not penetrate so deep in soils that are loose or have low supporting power. This period also marks the introduction of diesel power in truck design.

About five years ago the bottom dump truck-trailer type of earth-moving unit mounted on rubber tires came into the field. These machines were first of 8 cu. yd. capacity but the later models reached the rated capacity of 12 cu. yds.

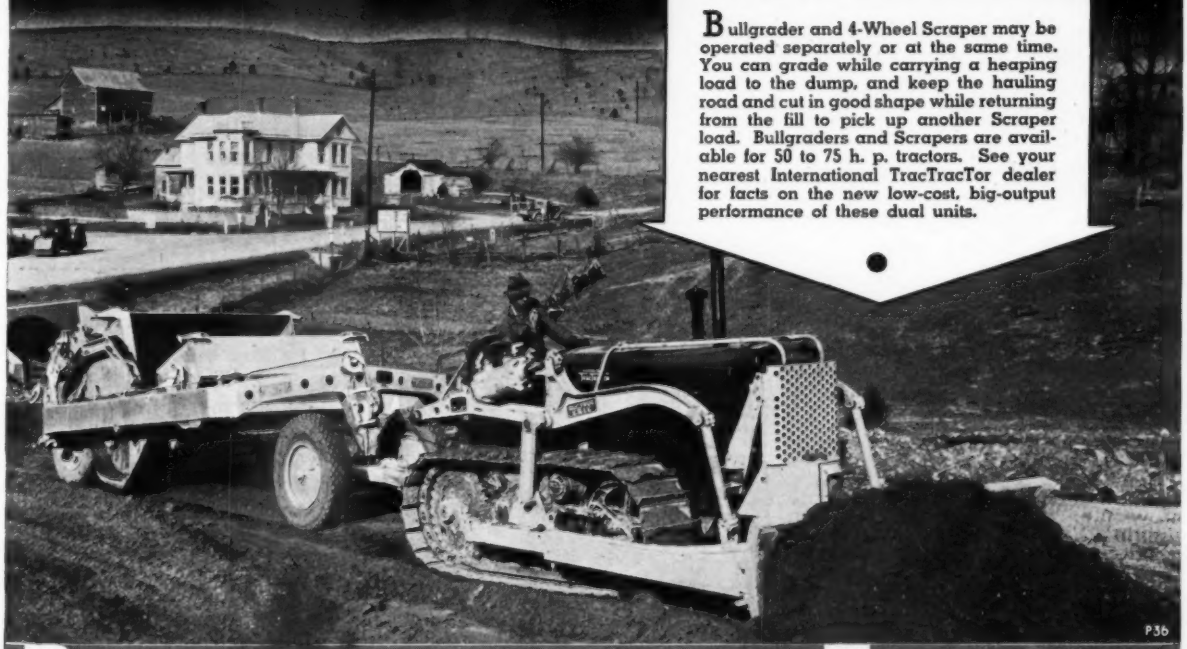
During the same period track-type semi-trailers increased in size. There are now in use in earth hauling, bottom dump models in sizes up to 18 cu. yd. rated capacity and two way hydraulic dump models for rock or mixed rock and earth up to 16 cu. yd. rated capacity. These larger sizes were made feasible because of the introduction of track-type tractors in sizes up to 95 drawbar horsepower.

Blade Graders are now made



One operator; one tractor; but all the flexibility of two separate units. That's what you get when you mount a Bucyrus-Erie Bullgrader on an International Tractor and hook a 4-Wheel Scraper on behind. With this fast-moving dual unit, one man can handle the entire range of dirt moving, road grading, and finishing in a way that means new lows in cost and, new highs in convenience and profit.

Double your Tractor's Usefulness
Multiply your PROFITS



Bullgrader and 4-Wheel Scraper may be operated separately or at the same time. You can grade while carrying a heaping load to the dump, and keep the hauling road and cut in good shape while returning from the fill to pick up another Scraper load. Bullgraders and Scrapers are available for 50 to 75 h. p. tractors. See your nearest International TracTracTor dealer for facts on the new low-cost, big-output performance of these dual units.

P36

Bucyrus·Erie

SOUTH MILWAUKEE, WISCONSIN

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with a box type single frame construction which permits of a very wide range of blade positions. This provides for cutting or finishing banks on any slope desired. The models with twelve foot blade are the largest in general use in highway construction. They may be had either in hand controlled or power controlled models. Motor Graders are of larger size, greater horsepower and with that same single box frame construction that permits a wide range of blade positions. The tandem drive with single low pressure tires develops traction commensurate with the power of the engine and permit the use of motor graders where soil conditions were previously prohibitive. The longer wheel base permits the 12 foot blade to revolve through a complete circle without striking either front or rear wheels. Thus the blade action is effective either in forward or reverse movements. This is a feature that is very desirable in soil stabilization work.

Improvement of Elevating Graders

Elevating Graders also made another progressive step. With the development of improved steel, larger discs were used. When pulled behind 95 H.P. tractors they were capable of cutting and turning more earth than a 48-inch belt powered by a 50 H.P. engine was capable of discharging. Hence engines of approximately 65 H.P. were used on the 48-inch elevating graders. Power controls were substituted for hand operation. With this combination an output of 400 cu. yds. per hour can be attained when loading into large wagons. Thus the output of elevating graders was multiplied by five since the days when horses and mules pulled the machines whose belts were driven by power from the bull wheel.

During the past five years, tractor-drawn scrapers of the carry-type received general acceptance and a widespread use. These had been in the process of development on the Pacific Coast but their introduction east of the Rocky Mountains and their general acceptance was subsequent to the introduction of the 95 horsepower tractors. Two and four wheel scrapers suitable for tractors ranging from 40 to 75 H.P. were developed to answer the demand for smaller units.

Carry-type scrapers may be divided into three classes according to the manner of discharging the load. In one type the load is gravity dumped by tilting the bowl forward and spread in layers whose depth is controlled by the position of the cutting edge. The front dumping scrapers are usually four-wheelers and dump between front and rear wheels. The second type, rear dumping scrapers are two wheelers of the chariot type and have wheels at the side of the bowl instead of the rear. In general these are made without front wheels and the frame extends through a rigid tongue to a universal joint at the drawbar of the tractor.

In the third design the load is pushed out mechanically by forcing the tail gate forward while the front apron is raised. Variations of these three types, recently introduced, include a large 4-wheel unit, self propelled, with the power unit mounted on the front wheels and balanced by the weight of the scraper. Also new is a gravity dump wheeled scraper pulled by a wheeled tractor and designed for high-speed hauling.

Modern Scraper Production

Under ordinary conditions tractor-drawn four-wheel scrapers can move earth at approximately the following rates:

Length of Loaded Haul in Feet	Cu. Yds. Per Hour Compacted Load		
	5 yd.	8 yd.	13 yd.
400	57	85	115
600	46	68	92
800	38	56	76
1000	33	48	65
1200	29	42	57

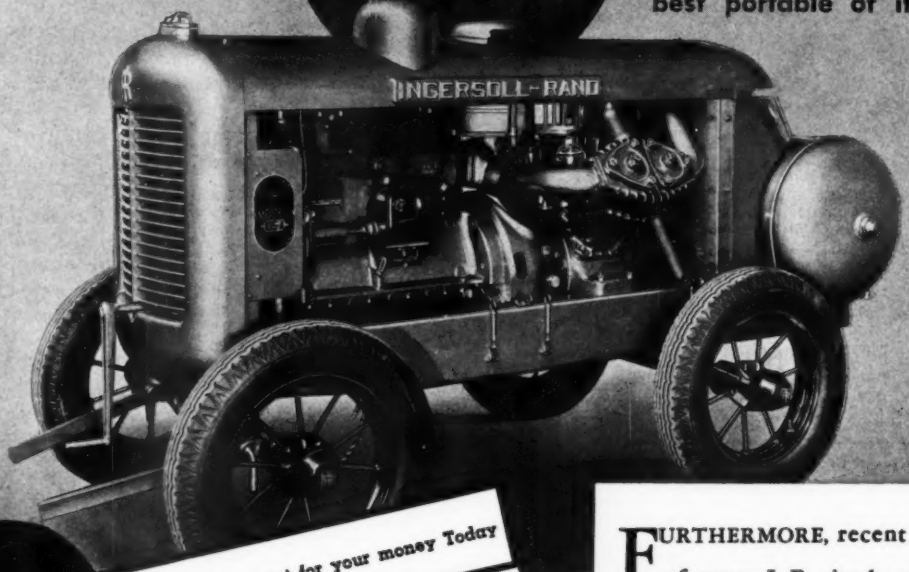
During the last ten years the method of making highway fills was undergoing a change. Attention has been called to the fact that during the period from 1929 to 1933 it was common requirement that earth fills be deposited and spread in layers. At that time it was generally considered that the travel of heavy track-type equipment during construction would sufficiently compact such layers to prevent subsequent settlement.

When additional compaction was required, tamping rollers were used. These consist of cylindrical drums or rollers, from the surface of which, at regular intervals, prongs or feet extend. As the rollers are pulled forward, the weight of the rollers is concentrated, the surface of the feet giving both pressure and impact to the layer to be compacted. The similarity of this action to that obtained by running a flock of sheep over a loose fill caused the early models to be called "sheep-

• Loading and screening sand and gravel for highway construction, this Haiss Loader can handle 2 to 3 yards per minute.

WHY THROW AWAY YOUR MONEY?

The new model I-R two-stage air-cooled portable compressor *gives* **53%** MORE AIR PER GALLON OF GASOLINE than the last model I-R single-stage water-cooled Portable when new . . . the best portable of its day.



A COMPARISON Shows what you get for your money Today

Model	1932 7 x 6 Type 20	1939 105A	ADVANTAGES
Type of Compressor	Single-Stage	Two-Stage	Lower Discharge Temperatures Higher Efficiency Capacity Maintained at Altitudes
Actual Delivered Capacity (cfm.)	100	105	5% More Air
Weight (lb.)	5200	4100	21% Less Weight Greater Portability
Cu. ft. per Gal. Gas	1700	2600	53% More Air per Gallon Greatly Improved Economy
Price per Unit Capacity	100%	79%	21% Reduction in First Cost per cubic foot per minute

FURTHERMORE, recent tests of *worn* I-R single-stage, water-cooled machines show savings as high as 70% for the new two-stage model.

High economy means less fuel, lower upkeep, fewer compressors on the job, reduced transportation costs, greater availability . . . MONEY SAVED.

Let our men work with you —call our nearest office.

Ingersoll-Rand

11 BROADWAY, NEW YORK, N. Y.

Atlanta, Birmingham, Boston, Buffalo, Butte, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Duluth, El Paso, Hartford, Houston, Kansas City, Knoxville, Los Angeles, Newark, New York, Philadelphia, Pitcher, Pittsburgh, Pottsville, Salt Lake City, San Francisco, Scranton, Seattle, St. Louis, Tulsa, Washington

744-2

For your convenience in writing to Ingersoll-Rand, you will find a card bound in this issue.

foot rollers." The name still clings to them.

In retrospect, it appears that the past twenty years have produced developments in road building equipment that are little less than marvelous. Some machines have reached a high degree of perfection. The improvement of others has been delayed if not entirely stopped by changing job requirements.

It is not intended to offer any prophesy of what the future has in store. It might be well, however, to consider that at present, one of the problems of job management is the proper consideration of POWER, SPEED CAPACITY and ECONOMY. Our present standards of rating are not a gauge of field performance.

The horsepower is generally determined by block tests on engines without accessory equipment. When fully equipped and mounted in a machine the engines often deliver, in useful work, only a fraction of the rated horsepower.

In a recently published article one exponent of speed in hauling called attention to the fact that regardless of rated top speed, the usual average speed attained in earth moving is about 7 miles per hour. In this article he did not state the effect of distance on average speed. It might be said, however, that under favorable conditions an average speed of 7 miles per hour may be attained on hauls of 800 feet while with somewhat less favorable conditions it would require 1400 feet to develop that average speed, even though the top rated speed of the vehicle is 35 miles per hour.

In a similar manner the rated capacity and pay loads differ. The former is a gauge of the amount of loose material that can be heaped in a container while the latter is the amount of compacted material that is actually handled. Probably, there never was a monthly estimate or final settlement where an additional payment was made for overloads or for speed of travel. The pay quantity comes in the amount of work done. Neither obvious effort nor great haste are earmarks of good management.

Reducing Unit Cost

Increasing the power, speed or capacity of equipment often results in a reduction in unit cost, when the amount of work to be done and the rate of production demanded is great. In attaining any of those three qualities, the utility of a machine may be restricted to special large jobs. For general work the idle time cost may become so great that economy is sacrificed. Continuity of operation at or near the desired production rate is a factor in reducing cost that should be given more attention.

There are two important causes of reduced output on highway grading. One is the failure of equipment to continue to function at or near the desired rate of production, through the varying soil and climate conditions that are normally to be expected. Few contractors will admit of providing, in their bid, for more than 20% profit. Yet many will continue to operate when production has de-

This unretouched photograph shows an unusual condition of corrugations in a sheave groove — due to the use of first a left lay wire rope, followed by a right lay rope. Note the resemblance to a rasp.

Give Your Wire Rope a Fair Chance

While wire rope is made to absorb a lot of wear and tear, the full service of which it is actually capable cannot be had if it is handicapped by poor working conditions. Take, for instance, sheaves and drums. If they are of too small a diameter for the size and construction of rope used . . . if they are made of unsuitable material . . . if the grooves are of improper design or size . . . if sheaves are out of alignment, or if they do not turn freely—shortened rope life is bound to result.

The above illustration shows a sheave made of material too soft to withstand the pressure put on it by the rope. Corrugations such as these, or any corrugations, produce a filing action that no wire rope can withstand for long.

When a new rope is installed on a badly corrugated sheave or drum, its handicap is even greater, for there is almost invariably a difference in the twist of an old rope and a new one—consequently the strands of the new rope will not fit into the old corrugations—which results in such rapid wear on the rope as to become critical in a very short time. When it is not possible to replace a corrugated sheave with one made of proper material, the corrugations should be removed before a new rope is put on.

The proper material to use for sheaves and drums depends on the rope pressure encountered. Cast iron is satisfactory if the pressure is not greater than 450 lbs. per square inch. Cast steel sheaves or drums are suitable for pressures between 800 and 900 lbs. per square inch. For higher pressures, manganese or chrome steel sheaves are recommended for both safety and long run economy.

This advertisement is published for the purpose of helping all wire rope users obtain safer and more economical service from their wire rope

A. LESCHEN & SONS ROPE CO.
WIRE ROPE MAKERS — ESTABLISHED 1857
5909 KENNERLY AVENUE — ST. LOUIS, MISSOURI, U. S. A.

NEW YORK • • • 90 West Street
CHICAGO • • 810 W. Washington Blvd.
DENVER • • • 1554 Wazee Street
SAN FRANCISCO • • 520 Fourth Street
PORTLAND • • 914 N. W. 14th Avenue
SEATTLE • • 3410 First Avenue South

HERCULES WIRE ROPE (GALVANIZED STEEL)

For your convenience in writing to A. Leschen and Sons Rope Co., you will find a card bound in this issue.

Timing
Timing . . . meeting the ball squarely with the bat at the height of its power makes champion long distance hitters. Because of automatic feed and patented rubber shock absorbers, Bucyrus-Erie drills strike with a force timed to perfection. Every blow of the bit is sharp and shattering. That's why they drill more footage at lower cost. 27-T, 29-T and 42-T — champions all — investigate them today.
BUCYRUS-ERIE COMPANY
SOUTH MILWAUKEE, WISCONSIN

For your convenience in writing to Bucyrus-Erie Company, you will find a card bound in this issue.

• A modern Austin-Western "99." This self-powered unit features all way steer and drive facilities.

creased more than 20%. The other cause of reduction in output is the failure to balance the minor or accessory units with the major production units. The selection of the type of equipment, the laying out of the job and the balancing of various units are problems of job management.

The improvements of the past twenty years have been due to the cooperation between the engineers, the constructors and the equipment manufacturers.

More Roads, More Jobs

(*Continued from page 328*)

local markets and the farmers will transport their produce to market at lower costs on newly purchased trucks. Bus routes will be established and the growth of entire communities will be encouraged. More automobiles will be sold as the public has better facilities for using them. In addition to the thousand men originally employed to construct the road, demands for additional construction and factory labor in the building material lines is immediately stimulated and the incentive for outside agencies to invest additional funds has been provided. Beyond this construction employment, the labor of the original thousand men who build the road eventually brings about the creation of permanent jobs for additional thousands of our unemployed in the services that go with the highway.

America has today a real need for improved highways. We need to replace many of our roads built for 40-mile an hour automobiles with highways adequate to handle safely the automobiles of today. We need better farm to market roads to reduce the farmers' transportation costs and increase his opportunities in diversified cropping. We urgently need better trunk highways through our cities and improved highway facilities to take care of the badly congested traffic on the outskirts of our metropolitan areas.

Our need for highways is a growing one. It is a self-supporting function of government with an adequate source of earmarked taxes gladly paid by the users of highways. Politicians might do well to study this situation from the standpoint of the happy relationship existing with this group of taxpayers and extension of this type of self-financing activity rather than from the standpoint of disrupting this situation by diversion of highway funds to other activities.

Construction of Old National

(*Continued from page 332*)

wit: All the trees of one foot in diameter (at one foot from the ground) and under to be cut level with the surface; all from one foot up to 18 inches in diameter to be cut not exceeding nine inches from the surface of the ground; and all trees over 18 inches in diameter to be cut not exceeding 15 inches from the surface; and all stumps within the said center of 30 feet must be rounded and trimmed in such a manner as to present no serious obstacle to carriages. Of the remaining 50 feet, all stumps must be left not exceeding one and a half feet high."

The careful manner in which is here described the extent to which stumps might be left in the most important overland traffic route then being built in the country, indicates the nature of the roads in the Middle West.

HAYWARD BUCKETS

PLAY SAFE . . .
CHOOSE HAYWARDS

Hayward Buckets won't fall down on the job, cause time out, or require costly repairs.

THE HAYWARD COMPANY
52-54 Church Street
New York, N. Y.

Here Is a Bargain
in used excavating equipment

(taken from page 366)

BUCYRUS-ERIE 33-B — Gasoline Combination 1¼-yd. shovel and 50′ boom clamshell and dragline. Wisconsin M-4-A 6-cylinder 5¼″ x 6″ engine. Electric starter. Practically new. Used about sixty days. Located Boston. Box 2284

For other bargains in shovels, draglines, cranes, locomotives, trenchers, and miscellaneous contractors' equipment turn to page 366.

For your convenience in writing to The Hayward Company, you will find a card bound in this issue.

BUCYRUS-ERIE

Shovels — Draglines — Cranes — Clamshells — Dragshovels — Skimmers

Bullgraders — Bulldozers — Scrapers

BUCYRUS-ERIE COMPANY

Headquarters: SOUTH MILWAUKEE, WISCONSIN, U. S. A.
Works: South Milwaukee, Wis., Erie, Pa., Evansville, Ind.

ALABAMA, BIRMINGHAM: Bucyrus-Erie Company, 2212 Comer Building. Phone 3-0642.
MONTGOMERY: Ray-Ewbank Machinery Co., 101 Chandler St.
ALASKA: (See Washington, Seattle).
ARIZONA, PHOENIX: Arizona Tractor & Equipment Co., 1400 N. 19th St.
ARKANSAS, LITTLE ROCK: Lyons Machinery Company.
CALIFORNIA, LOS ANGELES: Crook Company, 2900 Santa Fe Avenue. Phone Kimball 5137.
SAN FRANCISCO: Bucyrus-Erie Company, 390 Bayshore Blvd. Phone Atwater 2341.
OAKLAND: Industrial Equipment Co., Outer Harbor.
COLORADO, DENVER: Ray Corson Machinery Co., 1646 Wazee Street.
CONNECTICUT, NEW HAVEN: The W. I. Clark Co., 1811 Dixwell Avenue.
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GEORGIA, ATLANTA: W. C. Vines, 1143 Briarcliff Road. Phone Hemlock 8376.
ATLANTA: R. S. Armstrong & Bro. Co., 676 Marietta. Phone Jackson 2010.
IDAHO, BOISE: The Inter-Mountain Equipment Co., Broadway at Myrtle Street, Phone 171.
ILLINOIS, CHICAGO: Bucyrus-Erie Company, 1312 Bankers Bldg., 105 W. Adams Street. Phone Franklin 5321.
CHICAGO: Great Lakes Supply Corp., 324 W. 36th St.
INDIANA, INDIANAPOLIS: A. F. Deaney, 719-721 N. Pine St.
IOWA, CEDAR RAPIDS: James W. Bell, 916—16th N. E.
KANSAS, PITTSBURG: Bucyrus-Erie Company, 209 East 4th St. Phone 164.
KENTUCKY, LOUISVILLE: Brandeis Machinery & Supply Co., Brook & Warnock Sts. Phone Magnolia 6600.
MAINE, PORTLAND: Maine Truck-Tractor Co.
MARYLAND, BALTIMORE: Stuart M. Christhilf & Co., 205 Snow Bldg. Phone Calvert 4310.
MASSACHUSETTS, BOSTON: Bucyrus-Erie Company, 240 N. Beacon St. Phone Stadium 3152.
MICHIGAN, DETROIT: Abrams-Anderson Co., 10425 Northlawn Ave.
MINNESOTA, CROOKSTON: Wm. H. Ziegler Co., Inc., 122 So. Main St.
DULUTH: Wm. H. Ziegler Co., Inc., 304 Lake Ave. So. Phone Melrose 681.
MINNEAPOLIS: Wm. H. Ziegler Co., Inc., 2331 University Ave. S. E. Phone Gladstone 7071.
MISSISSIPPI, JACKSON: Mississippi Road Supply Co. Telephones: Long Distance 9906, Local 3676.
MISSOURI, KANSAS CITY: Bucyrus-Erie Company, 818 Olive St.—Suite 906. Telephone Chestnut 1354.
ST. LOUIS: Bucyrus-Erie Company, 818 Olive St.—Suite 906. Telephone Chestnut 1354.
MONTANA, BILLINGS: Connelly Machinery Co., 509 N. 27th Street.
GREAT FALLS: Connelly Machinery Co.
MISSOULA: Westmont Tractor & Equip. Co.
NEBRASKA, OMAHA: Cardinal Supply & Mfg. Co., Sunderland Bldg.
OMAHA: Fuchs Mchy. & Supply Co., 1102 Farnam Street.
NEVADA, RENO: Steiner Equip. Co., East 4th Street (P. O. Box 471)
NEW JERSEY, ENGLEWOOD: Bucyrus-Erie Company, 214-216 South Dean Street. Phone 3-6727.
NEW MEXICO, ALBUQUERQUE: R. L. Harrison Co., Inc., 209 N. 4th Street.
NEW YORK, NEW YORK: Bucyrus-Erie Company, 30 Rockefeller Plaza, Room 3627. Phone Columbus 5-4395.
NEW YORK: Tractor & Equipment Corporation, 355 Walton Ave. Phone Mott-Haven 9-5500.
SYRACUSE: Bucyrus-Erie Company, 303 Draper Ave. Phone 6-1078.
NORTH CAROLINA, GREENSBORO: E. F. Craven Company.
OHIO, CINCINNATI: Bode-Finn Co., 1634 Central Avenue.
MENTOR: Earl Ives Equipment Co.
OREGON, PORTLAND: Clyde Equipment Co., 17th & Thurman Streets. Phone Broadway 5561.
PENNSYLVANIA, PHILADELPHIA: Bucyrus-Erie Company, 821 Commercial Trust Bldg. Phone Rittenhouse 4281.
PITTSBURGH: Bucyrus-Erie Co., 1502 Clark Bldg. Phone Atlantic 4815.
PITTSBURGH: Beckwith Machinery Co., 6550 Hamilton Ave. Phone Montrose 4300.
TENNESSEE, KNOXVILLE: Brooks Equipment & Mfg. Co., 408-10 Davenport Rd.
MEMPHIS: Road Builders Equipment Co., 635 Union Avenue.
TEXAS, DALLAS: F. W. Knable, 1212 Magnolia Bldg. Phone 2-2943.
DALLAS: F. C. Crane Co., 3120 Grand Ave. Phone 4-2181.
EL PASO: Tri-State Equipment Co., 500 E. Overland Ave.
HOUSTON: Gulf Tractor & Equip. Co., 3100 Polk.
PECOS: Tri-State Equipment Co.
VERMONT, BARRE: Reynolds & Son, Inc.
VIRGINIA, RICHMOND: Virginia Tractor Company, Inc., 1628 W. Main St.
WASHINGTON, SEATTLE: Clyde Equipment Company, 3410 First Ave., South.
SEATTLE: Bucyrus-Erie Co., 3408 First Avenue South. Phone Maine 6424.
SEATTLE (for Alaska): Northern Commercial Co., 419 Colman Bldg.
WEST VIRGINIA, CLARKSBURG: General Equip. Co., Inc., 414 N. Fourth St.
HUNTINGTON: Chas. S. Porter Supply Co., 424 Fourth Ave.
WISCONSIN, MILWAUKEE: W. L. Hartley, 8021 Woodland Ave., Wauwatosa, Wis.

CANADA

BRITISH COLUMBIA, VANCOUVER: Finning Tractor and Equipment Co.
MANITOBA, WINNIPEG: Kipp-Kelly, Ltd., 68 Higgins Avenue.
ONTARIO, TORONTO: F. H. Hopkins & Co., Ltd., Commerce & Transportation Building.
QUEBEC, MONTREAL: F. H. Hopkins & Co., Ltd., 340 Canada Cement Bldg., Phillips Square. Phone Plateau 1136.

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BUCYRUS ERIE

Book Reviews

(*continued from page 348*)

ries, heavy construction work, and other industries employing rock-drilling machinery. Included in the bulletin are complete descriptions of the four sizes of air operated sharpeners, the Jackrod thread-forging device, and two sizes of oil furnaces. Copies of the bulletin, form 2176-A, are available from the Ingersoll-Rand Company, 11 Broadway, New York City, or any of their branch offices.

"The Diseases of Electrical Machinery," a book written for the information of all who are users of electrical machinery, has recently been published by the Chemical Publishing Company, Inc., New York.

The object has been to make as clear as possible the underlying causes of defects in electrical machinery, as well as to deal with the location and rectification of these defects. In the first chapter the basic principles of electrical machines are briefly reviewed. Some simple methods of testing and locating electrical faults are then explained. Two chapters deal separately with bearing and commutation defects. Thereafter machines are considered according to type under the heads: D.C. generators, D.C. motors, 3-phase induction motors, single-phase motors and control gear. The final chapter deals with some miscellaneous matters, such as earthing, power factor and static electricity.

Prospective buyers of crushing equipment are aided in their selection of the crushing equipment by a new 12-page "tabbed" folder, No. SF 39, prepared by the Universal Crusher Company, Cedar Rapids, Iowa. Universal's new line of weight-saving "streamlined" portable Crushing Units as well as many types of Stationary and Portable Plants are pictured and discussed. Copies are available on request.

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P&H MODEL 400 GASOLINE SHOVEL. Waukesha engine rebuilt late 1938. Machine generally good condition. Located Arkansas. Box 2285

BAY CITY GAS TRACTOR TYPE SHOVEL AND DRAGLINE—¾-swing. Fair condition. Located Pittsburgh. Box 2286

BUCYRUS-ERIE B-2 HIGH LIFT STEAM SHOVEL. Good mechanical condition. Located vicinity Boston. Box 2287

BUCYRUS-ERIE 37-B GAS DRAGSHOVEL. 40′ boom. 30″ cat treads. Long cat frames. Wisconsin D-3 6-cylinder 5½″ x 6½″ engine. Electric starter. Reconditioned from ground up. Many new parts. Excellent condition. Located Milwaukee. Box 2288

BUCYRUS-ERIE GA-2 GAS-AIR HIGH LIFT SHOVEL. Good operating condition. Located Eastern Pennsylvania. Box 2289

UNIVERSAL MODEL 35—Dragline—28′ boom. Waukesha 4½″ x 6″ engine. Recently overhauled. Fine condition. Box 2290

P&H MODEL 300-B GAS SHOVEL AND DRAGLINE. Used very little. Excellent condition. Located Southern Michigan. Box 2291

SPEEDER MODEL D-4 ⅝-YD. Dragline bucket and 35′ boom. Waukesha engine. Electric starter. Will rent. Good condition. Located Iowa. Box 2292

BUCYRUS-ERIE TYPE B HIGH LIFT STEAM SHOVEL. Good operating condition. Located Missouri. Box 2294

MARION Model 37 steam—Combination shovel and pile driver. 28′6″ shovel boom, 19′ dipper suitable for pile driving. Turbine light plant. ASME boiler. Good working condition. Located Baltimore. Box 2277

BUCYRUS-ERIE 10-B Gasoline Dragline including bucket. Machine shop reconditioned. Excellent buy. Located Milwaukee. Box 2266

LORAIN-40 Gas Shovel. Electric starter. Waukesha engine. Located North Carolina. Box 2267

BUCYRUS-ERIE 48-B Combination 2¼-yd. Shovel and 60′ boom dragline including 2½-yd. drag bucket and Kohler 1½ KW light plant. Buda Diesel engine. Electric starter. Engine completely overhauled recently and extensive repairs otherwise made to machine. Excellent condition. Ready to go to work. Located New Mexico. Box 2270

KOEHRING MODEL 503. 1¼-yd. Combination shovel and 60′ boom Dragline. Boom can be reduced to 50′. Shovel equipment new in June, 1938. Wisconsin D-4 engine. Electric starter. Excellent operating and mechanical condition. Located New Jersey. Box 2268

BUCYRUS-ERIE 43-B Gas shovel. 23′ boom, 17′ dipper handle, 1½-yd. dipper. Chain crowd. Electric starter. Wisconsin 6-cylinder 6″x7″ Model E engine. Extensively repaired. Excellent shape. Located vicinity Boston. Box 2257

LARGE SHOVELS, CRANES AND DRAGLINES
2½ Cubic Yards and Over

TYPE P McMYLER LOCOMOTIVE CRANE. Built 1927, 100 ft. Goose-neck boom, 19 ft. gauge, 20,000 lb. lifting capacity at 90′ radius. Single line 5-yd. bucket. Very little used and in excellent condition. Located on coal dock in Northern Michigan. Box 2283

BUCYRUS-ERIE 100-B Electric shovel. 2300 volt, Ward Leonard control. New 1927, excellent operating condition. 3-cu. yd. dipper. Box 2263

MISCELLANEOUS EQUIPMENT

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FOR SALE, REASONABLE: All located Cleveland, Ohio. 1—Austin Trencher Model 42-15, $1,000 F.O.B.; 1—Buckeye Trencher Model 201, $1,300 F.O.B.; 1—Goose-neck Trench Hoe Boom for P&H 600, slightly used, $800 F.O.B. Box 2282

DIESEL GENERATING PLANT consisting of 400 HP 6 cylinder Busch-Sulzer Diesel engine direct connected to one 350 KVA generator with exciter, mounted on heavy cast iron base which can be shipped without dismantling. Includes Dix Air Compressor and starting bottles, motor driven circulating pump, inside fuel tanks, switch board, including panel for engine and outgoing panel for line, and transformers for switchboard. Excellent condition. Located Arkansas. Box 2272

52—8-YD. PHOENIX TYPE QUARRY CARS, 4′8½″ gauge, Std., heavy axles, good condition, have been used on tipple dump, ¾″ size MCB couplers.

15—8-YD. SIDE DUMP CARS, Std. gauge, wood bodies, steel under-frame. Box 2262

DIPPER FOR SALE

1—3-yard Aluminum Dipper complete. Lip, teeth and front castings of Manganese Steel. Pyramid Coal Corp., Pinckneyville, Ill.

CAR TRANSPORTER

CAR-TRANSPORTER or stacker with reach of 135′ and dumping height of 75′. Equipped with 4-yard aluminum car. Caterpillar-mounted and suitable for use with shovel having per hour output of 250 yards. Electric drive, 3-phase, 60-cycle, 4000-volt current. This car transporter is in excellent condition and priced to sell. Located near Kansas City, Missouri. Box 2010

BLAST-HOLE DRILLS

14—Sanderson-Cyclone Model 14, non-traction—six Model 14-SR, traction type, electric blast-hole drills. Also six Loomis Clippers—Models 4 and 44, steam traction. All in good condition, available for immediate shipment. Located New York. Priced to sell. Box 2167

WANTED

WANTED: ¾-yard, three-quarter swing gas shovel or trench hoe. Good condition only—full particulars in first letter. Trencher 7′ range. Portable belt conveyor, two-wheel type. Box 2281

WANTED: Used Insley K-12 dragline, ½-yd. State condition and price. Box 2295